GYMNASIUM CONSTRUCTION

NARRAGANSETT MACHINE COMPANY
PROVIDENCE, R. I., U. S. A.

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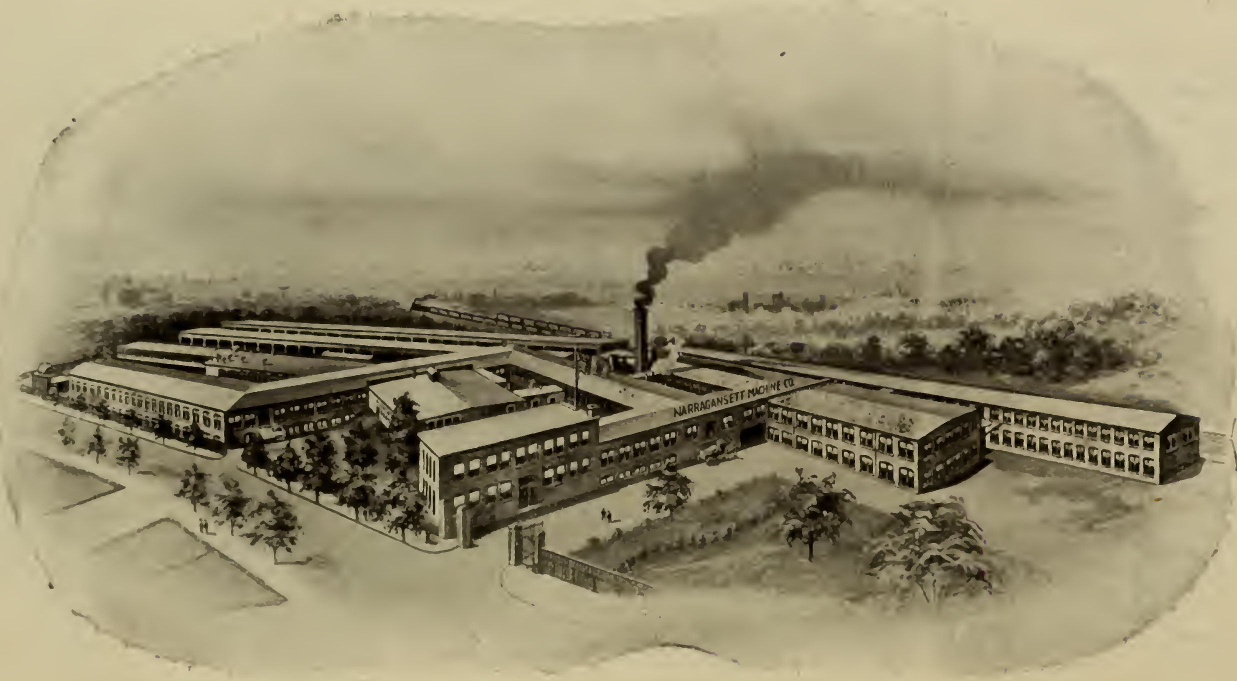
Chicago
1504 Monadnock Block

New York
52 Vanderbilt Ave.

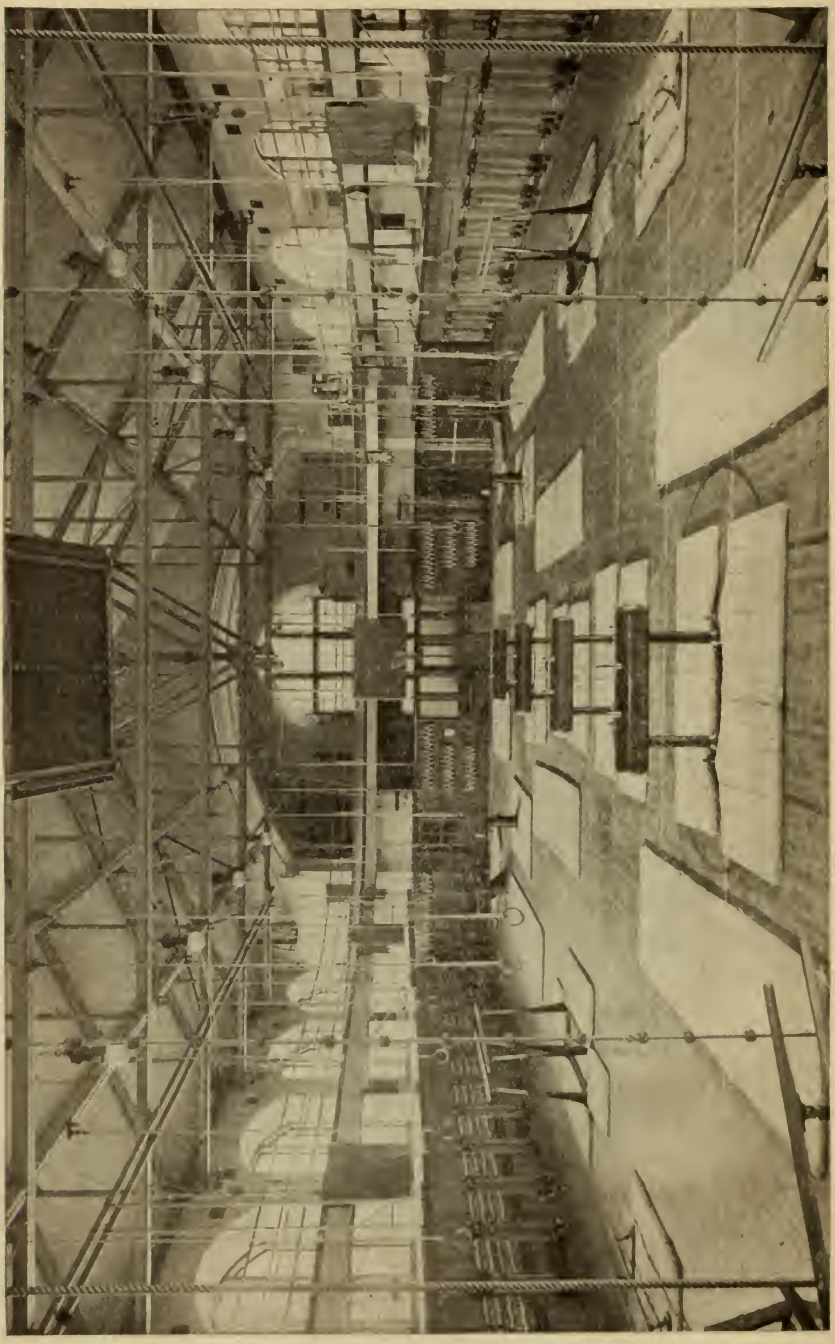


FACTORY OF THE NARRAGANSETT MACHINE COMPANY
Providence, R. I.

FOREWORD

GYMNASTIC apparatus has probably been installed in every type of building, from the basement of a dwelling to the most spacious armory. In many of these improvised gymnasia, the apparatus is installed and used under most severe difficulties, due to the inappropriate structural features of the building. These limitations should never be tolerated in a building designed as a gymnasium. Any style of exterior architecture may be used, but if wholly successful results are to follow, the inside structural details should be arranged to allow the most advantageous use of gymnastic equipment.

It is the particular purpose of this presentation to show the principles of construction which harmonize with equipment requirements, and to outline, in general, various other essential building features.



COLLEGE OF THE CITY OF NEW YORK. GYMNASIUM.

SCOPE.

The planning of a building, to be used exclusively or in part for modern physical training, should be preceded by a careful study of the following subjects:

I. Main Gymnasium.
II. Running Track.
III. Auxiliary Exercise and Game Rooms.
  A. Special Exercise Room.
  B. Storage Room.
  C. Wrestling, Boxing and Fencing.
  D. Hand Ball Courts.
IV. Department Offices.
  A. General Office.
  B. Director's Private Office.
  C. Examination Room.
  D. Club and Library Room.
V. Locker Rooms.
  A. Division of Locker Space.
  B. Various Locker Systems.
  C. Standard Locker Sizes.
  D. Women's Dressing Rooms.
VI. Baths.
  A. General Requirements.
  B. Women's Special Requirements.
VII. Natatorium.
VIII. Toilet Rooms.

GENERAL ARRANGEMENT.

No fixed rule can be established for the arrangement and relation of various rooms and facilities. Accessibility, proximity, correlation and supervision for related activities are essential. As each building presents its own peculiar possibilities and limitations, a careful study and analysis of each plant is necessary.

The following general relationships, however, are advisable:

The locker rooms should be as close as possible to the gymnasium. Necessary connecting passage ways should be short and convenient.

The bath rooms should open from the locker rooms, serving, if possible, as the passageway between the locker rooms and natatorium. Under no circumstances, should there be baths in the natatorium. The bath and locker rooms and natatorium should be on the same floor. The main gymnasium, auxiliary exercise rooms and the Director's offices should all be on one floor. All rooms should have all the light, sunshine and ventilation possible.

A gymnasium building, or physical department, combining the following structural details will fulfil the wide range of modern requirements and avoid the ordinary faults.

I. MAIN GYMNASIUM.

The acknowledged importance of physical education demands an attractive main exercising room of adequate size and proportion. It should have ample natural light and ventilation. It should be free from all obstructions, such as supporting columns, pilasters, low windows and radiators, projecting ventilation conduits, etc. Such stairways, sliding poles, etc., as may be necessary, should be located in the corners of the room, and all doors should be made to open outward.

SIZE. A careful survey of capacity requirements should precede the determination of the gymnasium room size. There should be an allowance of fifty square feet of floor space for each individual. Any smaller allotment will be found inadequate for all recognized forms of gymnasium activity.

SHAPE. The shape of the room should be rectangular. The relation of width to length should be approximately three to five. This ratio applies to rooms of all sizes, up to girder span limits in width, after which point the length may be arbitrarily extended.

HEIGHTS. Modern requirements in physical education and scientific mechanical developments have standardized the design and construction of gymnastic apparatus. Unless the gymnasium is planned to harmonize with these fixed requirements, the efficiency of the equipment will suffer proportionately. It is therefore, essential that the following height limitations be observed: (See Fig. 1.)

Height from floor to under side of ceiling beams or girders should be not less than 18 feet and not more than

22 feet. When building construction compels a girder height in excess of 22 feet above the floor, expensive and unsightly suspended pipe frames are necessary to afford attachment for suspended apparatus.

The height from the floor to the under side of galleries or tracks should not be less than 10 feet and not more than 12 feet. Any departure from this height range means a corresponding loss of efficiency in that part of the equipment which of necessity must be located under, or attached to, such galleries or tracks.

The height from the floor *to center* of apparatus wall board (hereinafter described) should be exactly 5 feet. Any variation in this measurement involves delay and limited results in an important class of equipment.

Height from floor to window sills should be at least 5 feet 6 inches. This is minimum; 8 feet is preferable. The lower sills of windows located on track or gallery levels should be not less than 3 feet above the highest point of the track bank.

Exposed radiators, heating coils, ventilating conduits, etc., should be at least 8 feet above the floor.

Height to top of wood wainscoting should be not less than 5 feet 6 inches; 6 to 8 feet is preferable. (See Fig. 2.)

FLOOR. Because of heavy loads and vibration resulting from concerted running and jumping, it is highly advisable to see that the gymnasium floor is extraordinarily strong and durable. If there is moisture or dampness, (from baths or natatorium) rising from the story below the gymnasium, the floor should be very carefully water-proofed against such moisture. This is particularly important if the floor is below grade with no story or rooms between same and the ground. If the latter situation cannot be avoided, a liberal system of tile drainage should be laid in the ground under such floor, and additional lines of drain tile should be carried around outside of the foundation walls. Serious trouble has resulted through the lack of proper attention to this important detail. Sound proofing should also receive attention, if gymnasium noise is to be minimized.

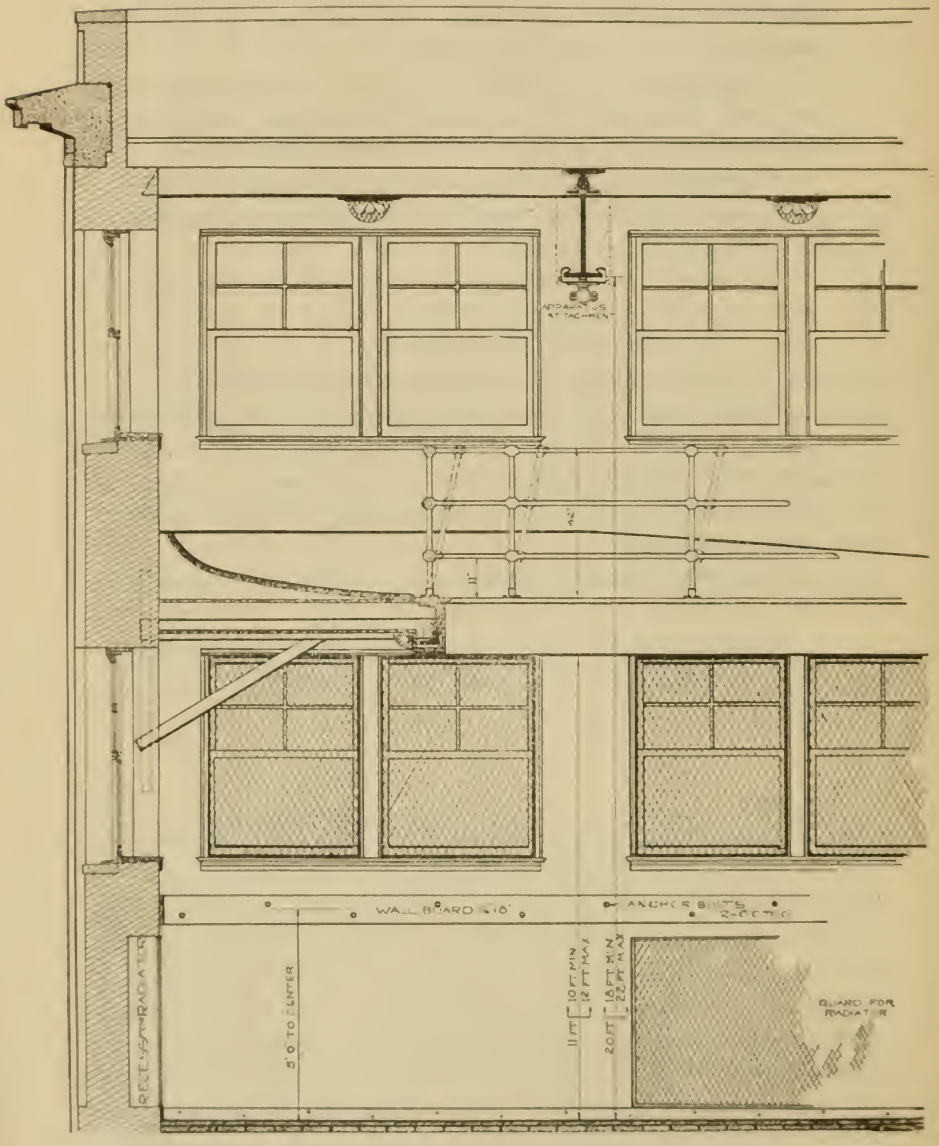


Fig. 1. **Correct Gymnasium Heights.** Other features shown illustrate various standard requirements.

If the supporting or sub-floor is concrete, the top nailing strips or sleepers should be spaced not more than 16 inches center to center; 10 to 14-inch spacing will be found better. Such sleepers should be wire tied to the concrete floor to prevent buckling, and to provide necessary resistance against a vertical lifting tension exerted by some pieces of gymnastic apparatus.

Before the finished floor is laid, a rough board floor of pine or other suitable, well-seasoned lumber should be securely nailed to the sleepers or joists. This rough floor should be laid diagonally. The top or finished floor should consist of high grade standard rock maple, blind bored and end matched. It should be clear and straight-grained, and laid lengthwise over building paper. There are other possible top floor materials, but they involve doubtful factors and cannot be recommended. If the above so-called double floor is not used, the single or top floor should be at least 1 1-2 inch thick and the ends of all pieces of flooring should "break" directly over the centers of sleepers or joists. An ordinary 7-8 inch single floor is inadvisable as it does not leave sufficient stock for screw holds after necessary apparatus floor plates are countersunk or set flush with the top of the floor.

After all other work in the gymnasium is finished, the floor should be sanded or scraped smooth and clean, and a light coat of raw linseed oil applied. Best results are secured if the oil is put on at or near the boiling point. To accomplish this, a good-sized metal pail or can and a small portable oil stove will be found convenient. The oil should be brushed on with the grain of the floor (in 10 or 12-foot square areas at a time) and the surplus rubbed off before it gets cold. In a prominent gymnasium recently built, excellent results were secured by immersing in hot oil (and well rubbing) each separate piece of flooring. The oil was placed in a narrow "V-shaped" metal trough and heated by gas flames rising from a perforated horizontal pipe under same.

For keeping a properly finished floor in good condition, cleanliness is the first essential. Frequent polishing by means of a weighted, rough carpet covered box is effective. It should never be scrubbed with soap and water. Any floor treatment producing a highly polished, slippery finish, is dangerous in a gymnasium and should be carefully avoided.

WALLS. Gymnasium wall material and construction should be determined from the standpoint of requirements for attachment of apparatus, durability and smoothness of interior finish. Any solid wall construction, such as ordinary brick, concrete, or heavy studding (frame construction) fulfills the demands for apparatus attachment. Tile and all forms of hollow construction are not satisfactory. This applies to partition as well as to outside walls. The inside wall finish to a height of at least 6 or 8 feet above the finished floor should be hard, solid, and smooth. Hard pressed or glazed brick (light color preferable) are ideal for this purpose. Smooth cement and wood wainscoting on solid wall backing are satisfactory. Ordinary lath and plaster will not stand gymnasium requirements and should never be used. If wood wainscoting is preferred it will not be strong enough for the requirements of apparatus attachment unless securely anchored to the wall. Necessary

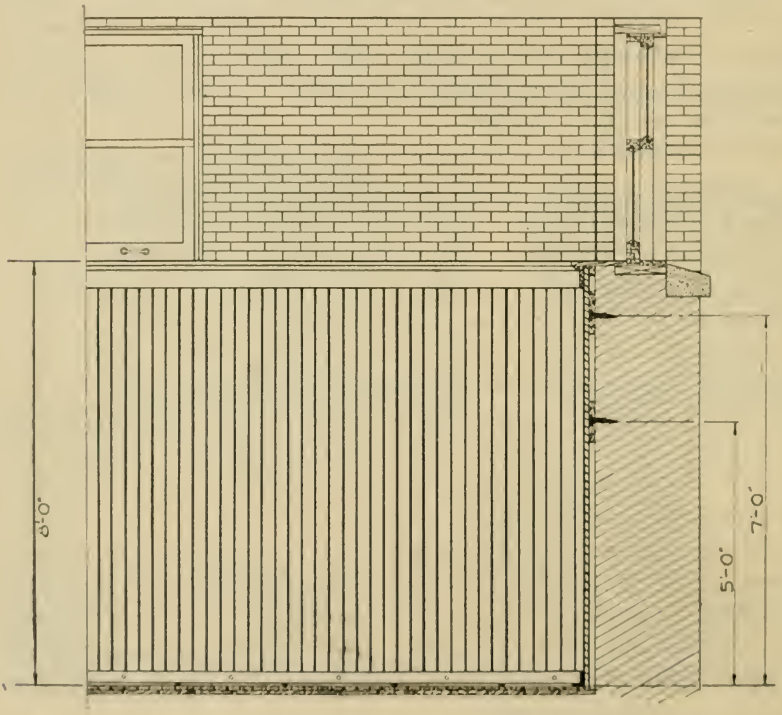


Fig. 2. **Wainscoted Walls.** Special wall attachment is required to provide necessary strength. Note double floor construction and angle iron base.

strength for this purpose is probably best secured by first bolting at 4-foot intervals, (not nailing) extra heavy grounds direct to the wall. One of these grounds should be 7 or 8 inches wide and should be set exactly 5 feet to center above the finished floor. Such a ground will take the place of an exposed apparatus or wall board. If the wainscoting extends to a height of 7 feet 6 inches or more, there should be another 6-inch ground bolted to the wall, 7 feet to center above the floor. Such attached wainscoting will prove very serviceable. (See Fig. 2.)

For interior walls of any finish, except the above described wainscoting, an apparatus wall board 8 inches wide by 1 1-4 to 1 1-2 inches thick, located 5 feet to center above the finished floor, should be provided. It should extend entirely around the room, and must be securely bolted to the wall. Anchor bolts should be spaced at intervals of from 3 to 4 feet. The heads of bolts should be flush with the face of the board. (See Fig. 3.)

In view of the weight and necessary design of iron bases for portable apparatus, the use of an ordinary wood base or wash board is not advisable. As such iron bases will chip and cut out even brick and cement, a 1-4 inch by 3 to 4-inch metal base strip (extending all around the room) is recommended (see Fig. 3.) A 2 by 4-inch angle iron produces a neater and more sanitary corner. The lower or horizontal leg of the angle should not exceed 2 inches (see Fig. 2).

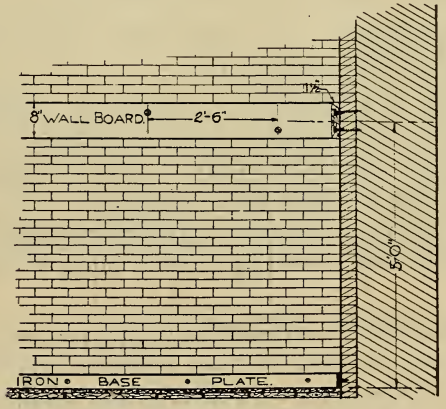


Fig. 3. Apparatus Wall Board. A flat iron base plate serves the same purposes as the angle iron base.

WINDOWS, and OTHER WALL INTERRUPTIONS. With all due regard for the need of ample natural light and ventilation, gymnasium windows should be located with reference to apparatus requirements. From the standpoint of gymnasium needs, there is no demand for windows lower than 6 feet from the floor to the lower sill. In fact, windows lower than this are a detriment. They require heavier than ordinary wire guard protection, produce objectionable glare from sunlight and cause dangerous drafts when opened for ventilating purposes. Besides, they constitute a limitation to the proper placing of wall apparatus. For gymnasia having running tracks from 10 feet to 12 feet above the floor, a clear wall height of 8 feet from floor to window sills fulfills all apparatus requirements and leaves an available window area of from 2 to 4 feet below the track. This, in addition to the unrestricted window area above the track level, has proven adequate and is recognized as best practice. For gymnasia without running tracks or galleries, there is a greater opportunity for proper window arrangement in keeping with apparatus requirements as above stated.

The one exception to this window height rule is the window between the Physical Director's office and the gymnasium floor. This window should be low enough to give the Director a view of the gymnasium floor while seated at his desk.

All gymnasium windows require removable wire screens or guards. The closer the windows are to the floor, the heavier the screens must be. If possible, guards should be so made and attached as to permit the opening of windows without removing or opening the screens. Unless windows are kept 8 feet above the floor, there will be difficulty in operating both windows and screens behind such wall apparatus as Stall Bars.

If sufficient light and ventilation cannot be obtained from windows, the possibility of skylights should be considered. If overhead light is necessary, the monitor type of roof is preferable, as it produces less glare and heat than flat skylights.

There should be no more doors in a gymnasium than necessary, and so far as possible, they should be made to swing out rather than into the room.

A most excellent sanitary development is the practice of installing a drinking fountain and one or more fountain cuspidors. Such fixtures should be of the recessed wall type and should be located

close to, or in the corners of the room. As a rule one drinking fountain is sufficient, but it is advisable to have a cuspidor at each end of the gymnasium.

If electric switch cabinets and similar wall obstructions cannot be avoided, they should be recessed and kept as close as possible to the corners of the room. The corners of wall projections—such as pilasters, doorways, etc., should have a generous round.

Wall radiators and heating coils should be so installed as to leave all walls clear to a point at least 6 feet above the floor; 8 feet would be better. Radiators should not be set on the floor unless recessed (preferably under windows). For such recesses, strong guards should be provided to prevent accidental contact. Radiators or coils attached to the under side of gallery are satisfactory, but they should be kept high enough to afford ample clearance for gymnastic activities. All exposed steam risers should be well covered and protected to a height of at least 6 feet above the floor.

The above wall restrictions for radiators apply also to outlets and conduits for ventilating purposes. However, flush ventilator grills are not objectionable if they do not extend lower than 6 or 8 inches, or higher than 4 feet above the floor. Regardless of the necessity for ventilation and plenty of it, there is no good place in a gymnasium for large exposed conduits.

The gymnasium should be kept at a temperature of between 65 and 70 degrees F. During exercises of extreme activity, the lower temperature will be found preferable. The question of heating and ventilating systems should receive very careful consideration. Both are technical subjects and should be so treated by specialists in these lines.

The subject of wall construction and interior finish has been thus detailed in the hope that it may lead to a clearer appreciation of a frequently misunderstood or neglected phase of gymnasium construction. Although most wall apparatus attachments occur in a zone or area of from 5 to 8 feet above the floor, the construction should permit attachment at any point. Some of the pieces of regular equipment requiring wall attachment at points higher than 8 feet are:

Swinging (or wall-hinged) booms, depending on type, 8 ft. 8 in. to 9 ft. 5 in. above floor.

Striking Bag Drum, 8 feet 4 inches.
Triplex Pulley Weights, 10 to 12 feet.
Intercostal Chest Weights, 10 to 12 feet.
Adjustable Ladders, 15 feet.
Volley Ball Net Cleats, 8 ft. 6 inches.
Backstops for Basket Ball Goals, 9 ft. and 13 ft. above floor.

Furthermore, pulleys of various shapes and sizes for controlling and hoisting suspended apparatus must be attached to the walls at heights corresponding to points of attachment for such apparatus. A change of Physical Directors or the inauguration of a new policy may require the installation of a type or quantity of equipment not anticipated at the time the gymnasium is built. It is therefore advisable to so construct the walls that they will meet attachment requirements at any point or height.

CEILINGS AND OVERHEAD BEAMS. The following consideration is intended to cover ceilings and beams only in their relation to the requirements for the attachment of suspended apparatus. No gymnasium, however beautiful, symmetrical or otherwise well appointed, can be a success unless the overhead construction provides necessary facilities for apparatus attachment. Ceilings, like walls, should be kept free from all obstructions such as ventilating conduits, radiation, or other extensive pipe systems. Most types of ordinary overhead construction, flat ceiling or beams (spaced not more than approximately 18 feet apart) fulfill or can be adapted to gymnasium requirements. If expensive suspended pipe frames are to be avoided, it is necessary FIRST to see that the beams, or points of attachment for suspended apparatus, are not too high above the floor, (see Fig. 1.) and SECOND, that they are horizontal in extent (i. e. parallel to the floor), and have a *common level.*

All forms of overhead construction are divided into two classes: first those which do not require advance or special preparation for apparatus attachment, and second, those which DO. The following types constitute the FIRST CLASS.

A. Open to the roof—trusses, or girders, (steel or wood) spaced not more than 18 feet apart and not fireproof or otherwise enclosed. In overhead construction of this kind, the lower members of trusses (and "deep" girders) must be well sway braced. (See Figs. 4 and 7).

Fig. 4. **An Example of Ideal Interior Construction.** Note longitudinal beams connecting and stiffening trusses.

B. Wood or plastered ceilings (attached *direct* to wood joists) with projecting, uncovered cross beams. (See Fig. 5).

C. Flat (wood or plastered) ceilings having no projecting beams or girders,—provided such ceilings are attached *direct* to cross beams and reasonably heavy wood joists.

The expression "attached *direct* to beams or wood joists" is used in connection with above ceilings "B" and "C" to direct attention to the necessity for such ceiling construction as compared to false or suspended ceilings which cannot be used for apparatus attachment.

The above types of construction need no advance or special provision provided proper height and common level requirements have been fulfilled. Attachment clips and fittings for "open" steel beams are shown in Fig. 6.

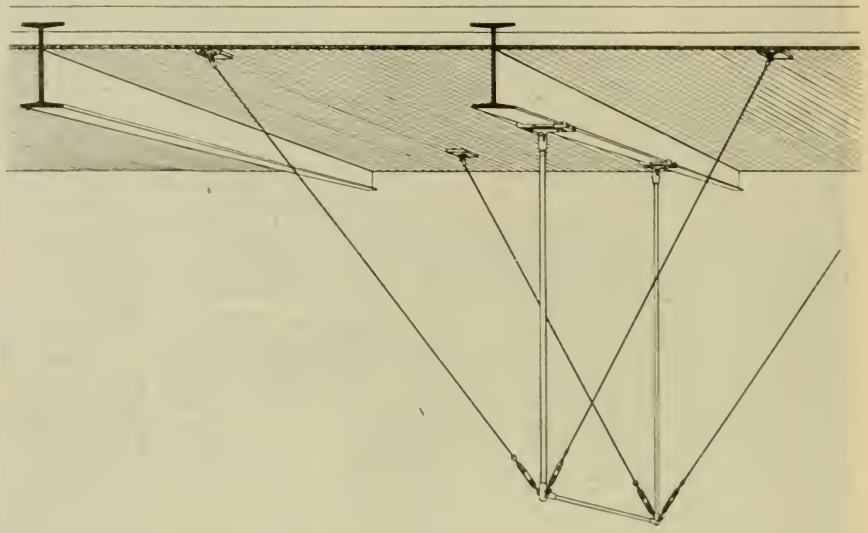


Fig. 5. **A Good Type of Overhead Construction.** Exposed beams greatly simplify the attachment of suspended apparatus.

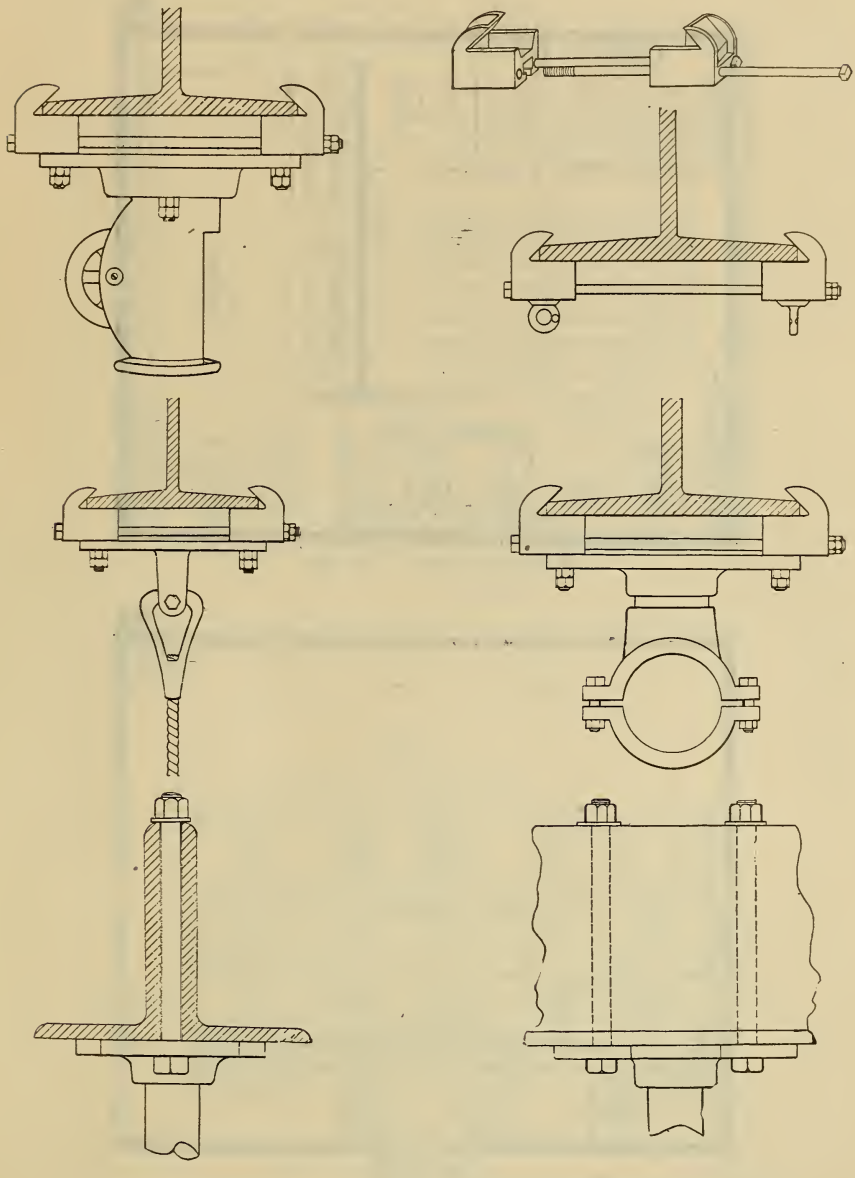


Fig. 6. **A Few Standard Beam Fittings.** For exposed beams of ordinary size and construction, the clamp principle is the safest and simplest. We carry a large variety of malleable iron clamps and fixtures.

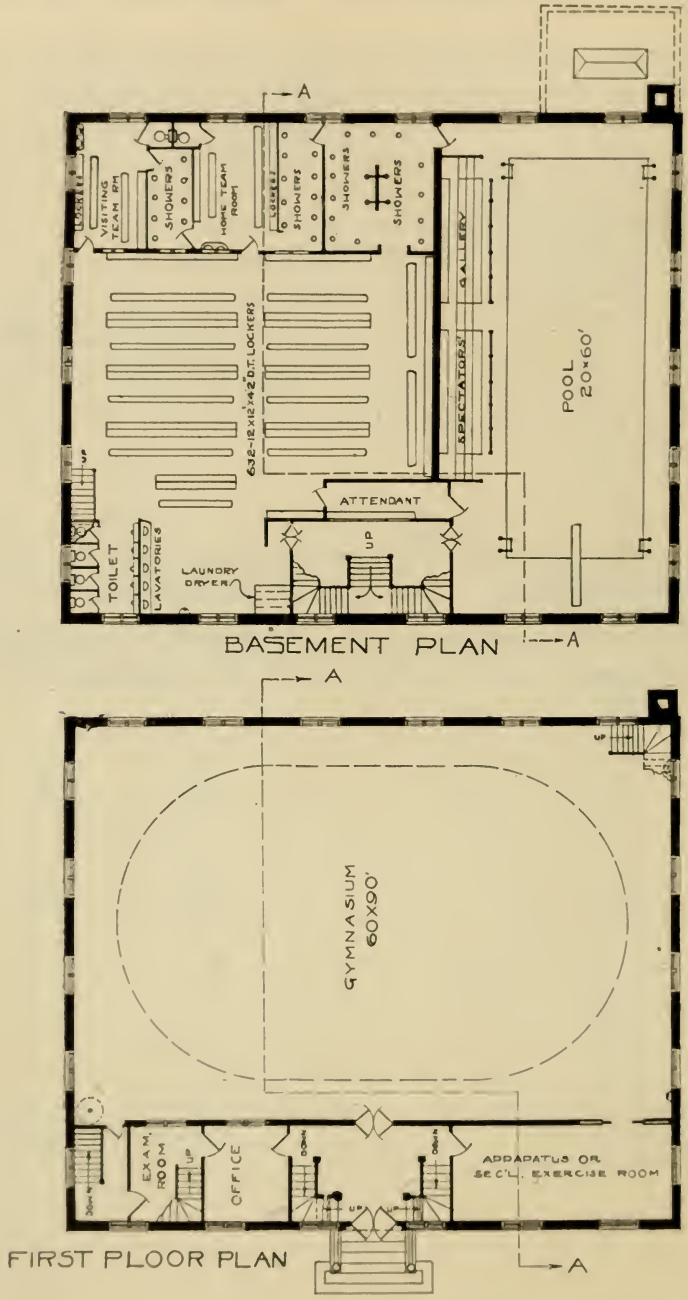
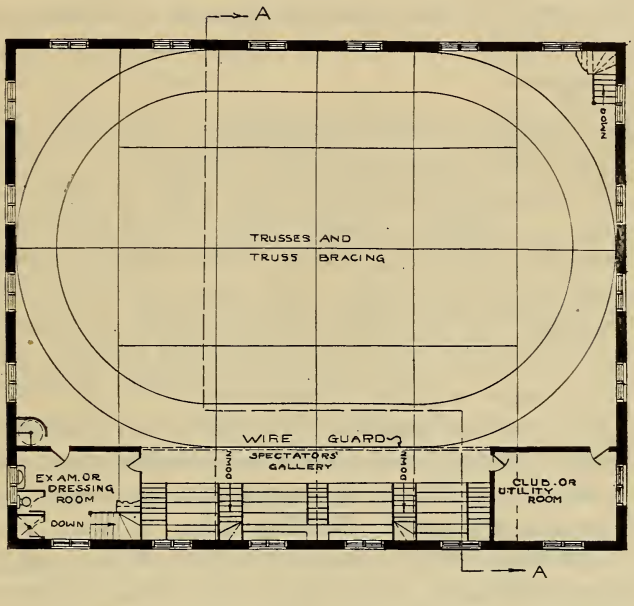
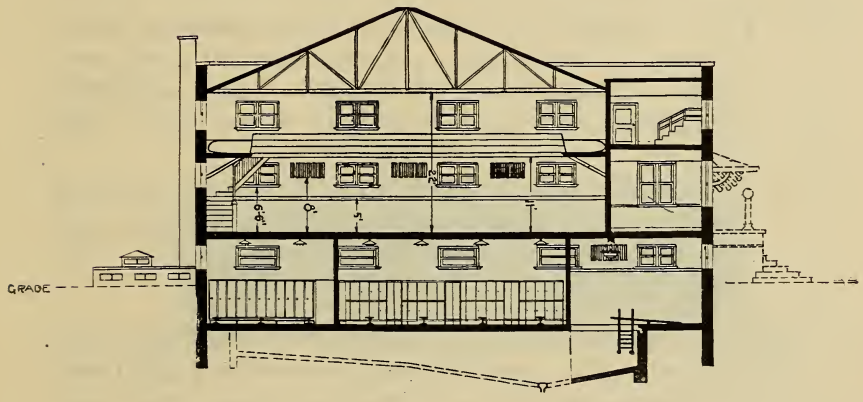


Fig. 7A. Building Outline Showing a Gymnasium for Men or Boys.



TRACK FLOOR PLAN



SECTION-A-A-

Fig. 7B. Suitable for small schools and colleges. The proportions and principles here illustrated will permit of expansion for requirements of greater size.

SECOND CLASS. The following forms of overhead construction involve difficulties of more or less gravity unless treated as hereafter suggested.

A. 1—Fire proofed (or otherwise enclosed), and reinforced concrete beams, projecting below ceiling level. To provide for apparatus attachment at any point on beams of this type, a standard 3-inch pipe or corresponding beam should be carried under each enclosed girder from wall to wall, or between gallery supporting rods if such rods intervene. For the treatment of such beams, (between 18 and 22 feet above the gymnasium floor), see Figs. 8 and 9.

2—If the height to girders is more than 22 feet, the attachment pipes must be suspended to a point not exceeding that height. In such cases, the suspended pipe frame must be securely sway braced by longitudinal pipe lines, or corresponding provision. (See Fig. 10).

3—If the height under beams is *less* than 18 feet, suspended apparatus should be attached to the ceiling. Unless such ceiling is attached direct to reasonably heavy wood joists, provision should be made *during construction* for carrying a 3-inch pipe or other exposed apparatus beam, from wall to wall. (See Fig. 11).

B. 1—Flat, or irregular, fire-proofed or concrete ceilings should be provided with hangers or inserts to support 3-inch cross pipes or beams (from wall to wall). Such attachment beams should be spaced from 15 to 18 feet apart. (See Fig. 12).

2—If the height to such ceiling exceeds 22 feet, provision should be made during construction for suspending a pipe attachment frame as indicated above under A-2. (See also Fig. 10).

C. False or suspended ceilings (having no projecting beams) cannot be used at all. Apparatus must be carried by a pipe frame or gridiron suspended from trusses or girders *above* such suspended ceiling. The pipe frame requirements are the same as shown in Fig. 10. In this type of construction all horizontal lines of pipe in the gridiron should be extended to walls and otherwise very carefully sway braced to prevent movement in any direction.

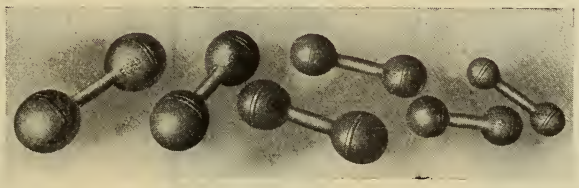
D. In double gallery construction (see Fig. 13) a suspended pipe gridiron is imperative. All horizontal lines of the pipe frame should extend and be attached to the face of the track or upper gallery.

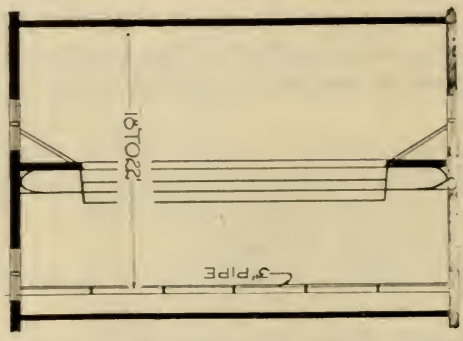
Arched and sloping ceilings, beams or trusses involve unwarranted complication and should be avoided in gymnasium construction. Trusses having lower members composed of round tie rods or bars cannot be used for apparatus attachment.

The size of pipe used for apparatus attachment is uniformly standard 3-inch.

(We furnish, without charge, specific pipe frame plans or directions for locating pipe hangers or inserts, on receipt of architect's plans showing necessary structural data.)

ARTIFICIAL LIGHTING. Experience to date suggests tungsten or nitrogen lamps, single or in clusters. As most suspended apparatus must be attached to the beams, the under side or lower flange of same should, therefore, be kept free from electric lights and conduits. The most desirable location for lights is on the ceiling *between* the beams, where they offer least obstruction and can be best protected by strong, hinged or detachable guards. Lights under the gallery should, if possible, be recessed into the under gallery ceiling or placed directly behind the gallery face. (See Figs. 17, 18 and 19.)





If the ceiling beams are concrete, fireproofed or otherwise enclosed, an apparatus pipe (standard 3 in.) beam, as here shown, should be attached to each girder. There should be a space of 2 in. between the top of the pipe and the bottom of the beam. Inserts (indicated by "X") for attaching such pipe beams should be placed during building construction. All attachment fittings should be malleable iron or mild steel. An assortment of our stock fittings is shown in Fig. 9.

In buildings having flat concrete or false ceilings, without projecting girders, the same pipe beam plan should be provided.

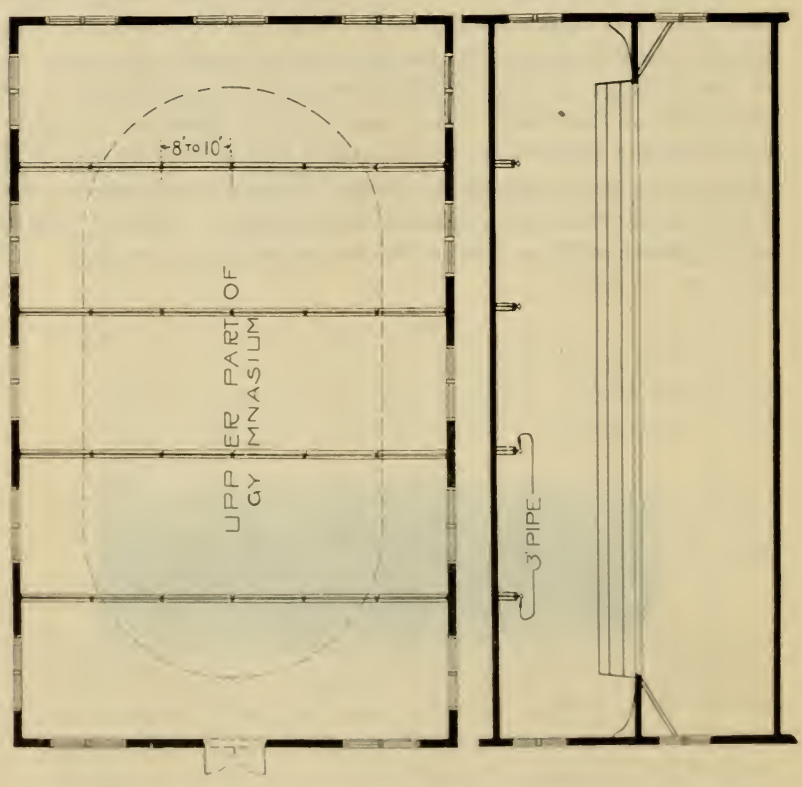


Fig. 8. **Typical Situation Pipe Beams for Attaching Suspended Apparatus.** These sketches represent a building in which the ceiling beam height is correct; for incorrect beam heights, see following sketches:

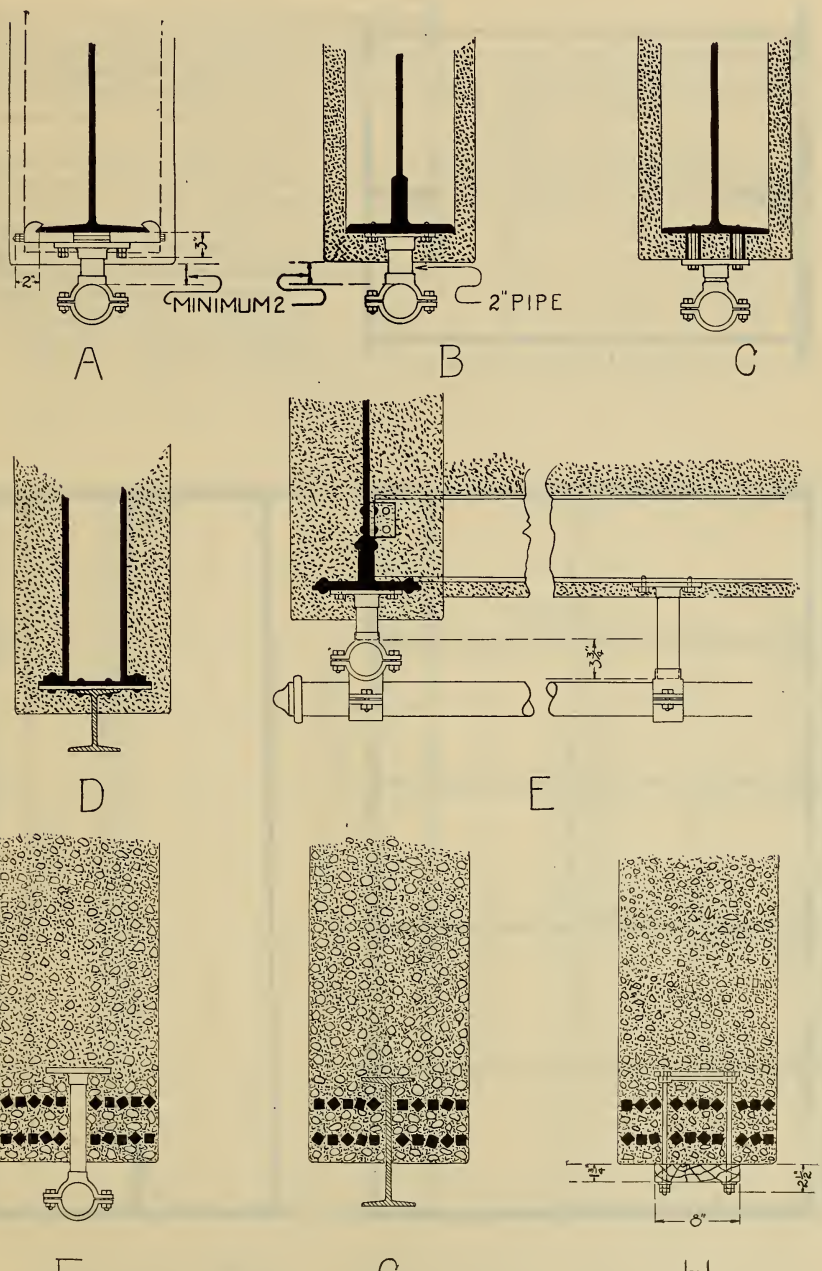
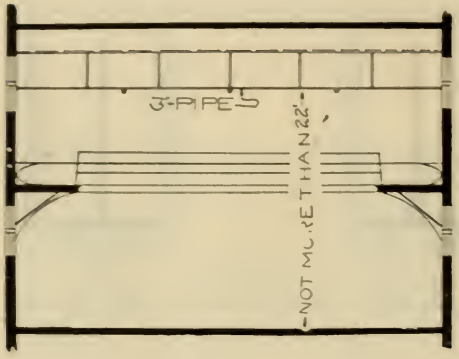


Fig. 9. **Standard Fittings and Methods** recommended for attaching apparatus beams to concrete and enclosed girders.



If space between girders exceeds 18 ft., intermediate pipe frame supports (indicated on plan sketch as "A") are necessary.

For method of attaching longitudinal sway-bracing pipes to cross-wise pipes, see sketch "E" Fig. 9. If girders are concrete, fireproofed or otherwise enclosed inserts ("X") should be placed during building construction. For standard attachment fittings, see Fig. 6 and 9.

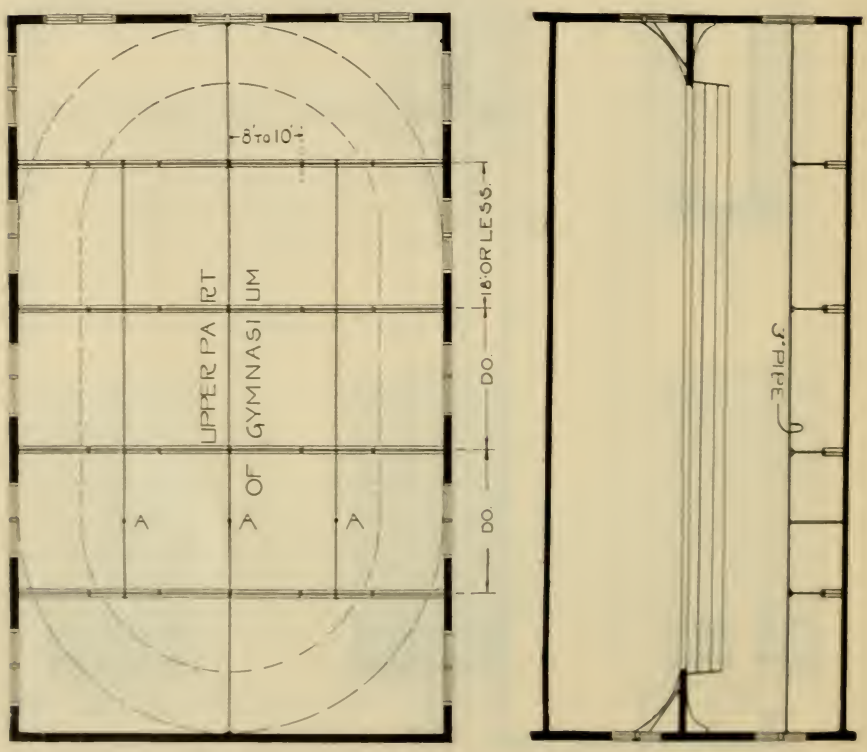
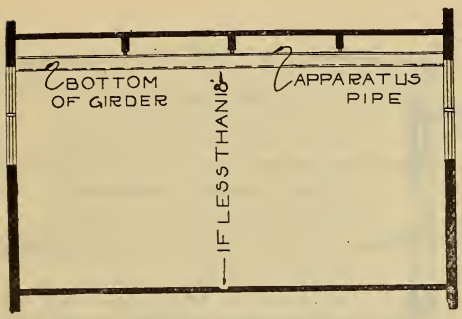
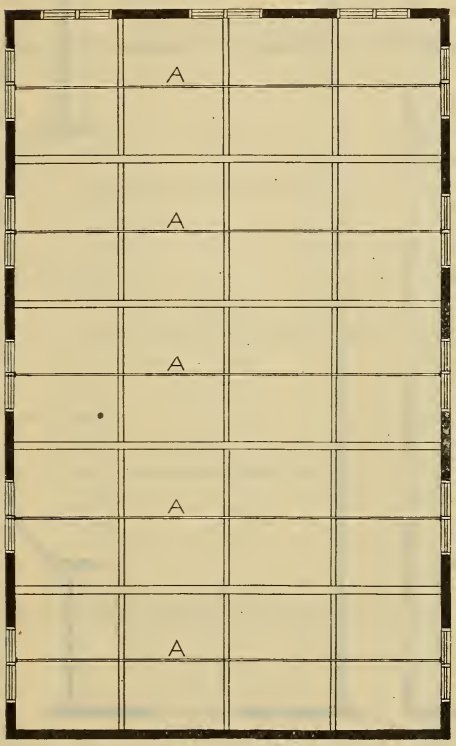


Fig. 10 Typical Apparatus Pipe Frame as applied to a Gymnasium in which the ceiling girders exceed the allowable maximum height for suspended apparatus.



In this case the girders are lower than permissible for suspended equipment. Apparatus pipe indicated as "A" or other beams (see Fig. 9) attached to higher beams or direct to the ceiling, are suggested to avoid the low girder limitations. If the beams to which apparatus pipe is to be attached, are concrete or enclosed, inserts for pipe support should be placed during building construction; this provision applies also if the apparatus pipe is to be attached to a flat ceiling in the event that such ceiling is concrete.

Inserts or hangers for supporting pipe beams should be spaced from 8 ft. to 10 ft. apart. All such attachment fittings should be malleable iron or mild steel. Various Standard fixtures are shown in figs. 6 and 9.



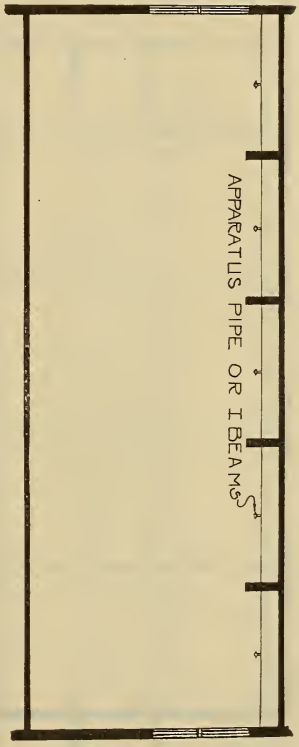
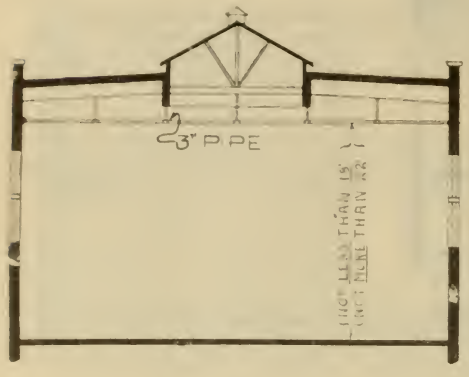


Fig. 11. **Low Girders:** A Condition Common to Many Basement Gymnasia. The above situation is the opposite of that shown in Fig. 10. The apparatus beam plan here shown would be necessary, also in a room having flat concrete or false ceiling without projecting girders.



If the overhead construction is concrete or fireproof, the inserts ("X") for supporting apparatus pipe, should be placed during construction. Such insert fixtures should be malleable iron or mild steel. For illustrations of our stock fixtures, see Figs. 6 and 9. In situations as here represented, several lines of longitudinal sway-bracing pipes (as in Fig. 10) or their equivalent, should be provided.

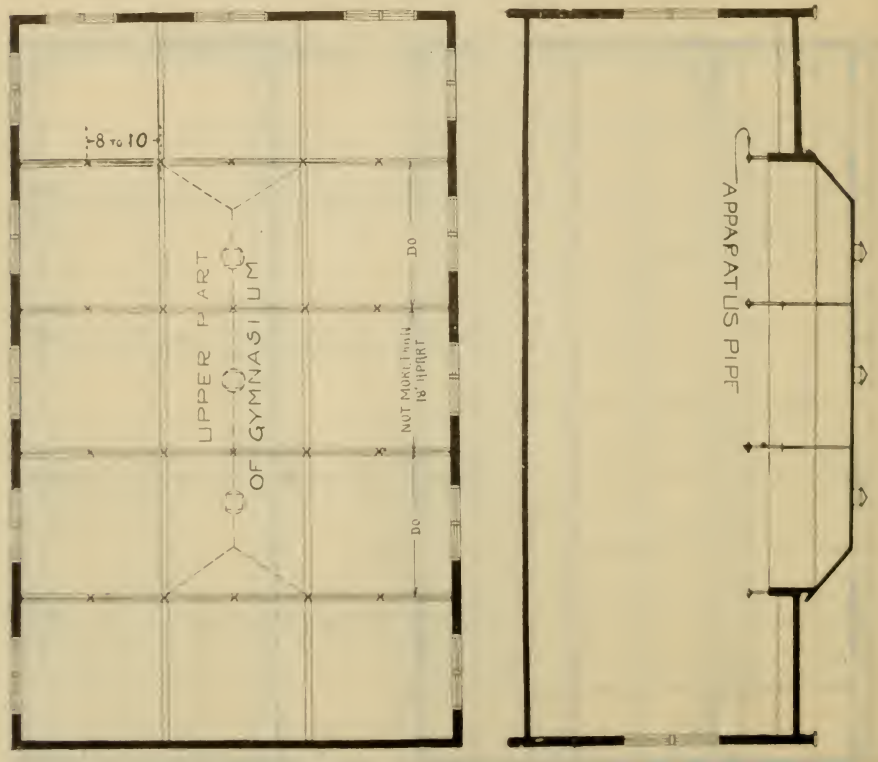
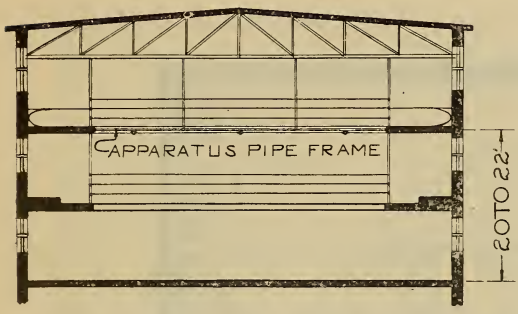


Fig. 12. **Apparatus Pipe Beams for Irregular or Sloping Overhead construction.** There should be no slope or "pitch" to gymnasium ceiling girders. If this type of construction cannot be avoided, auxiliary beams for suspended apparatus, are imperative. This requirement applies also to sloping or irregular ceilings from which there are no projecting girders.



The drop or vertical pipes, by which the suspended frame is secured to the overhead construction, should consist of standard 2-in. pipe.

The longitudinal lines are clamped to and below the cross pipe lines. For standard fittings and details, see sketch "E" Fig. 9. If the truss or girder spacings exceed 18 ft., intermediate supports ("A") are necessary for all longitudinal lines.

In concrete or fireproof overhead girder construction, malleable iron vertical supporting pipes ("X"), should be placed during construction. Such supports should be spaced (laterally) from 8 ft. to 10 ft. apart.

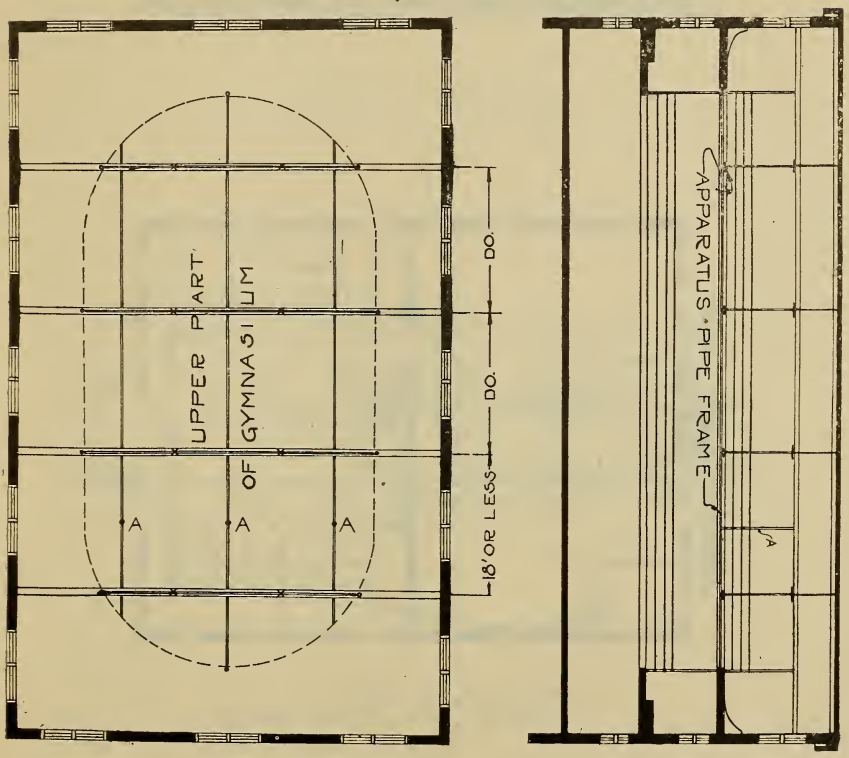
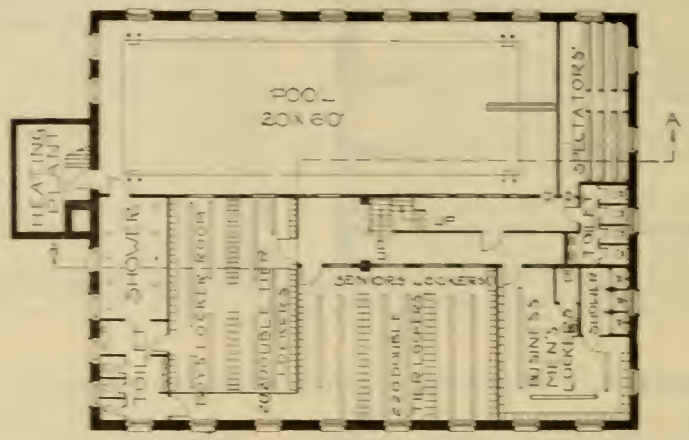
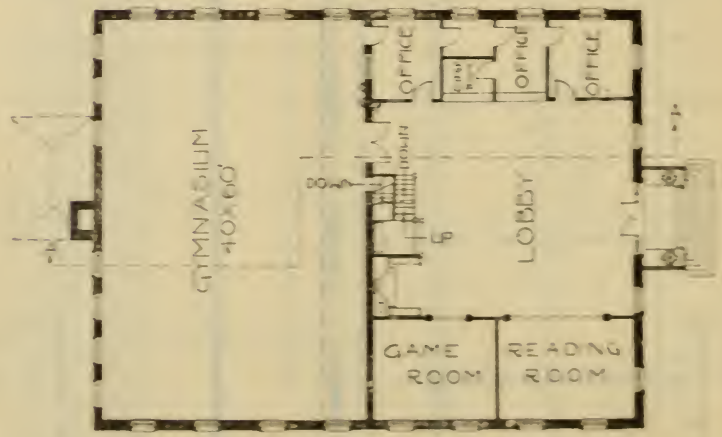


Fig. 13. **Apparatus Pipe Frame for Double Gallery Construction.** The ends of all pipe lines should extend and be attached to the face of the track or upper gallery, thus providing necessary rigidity.

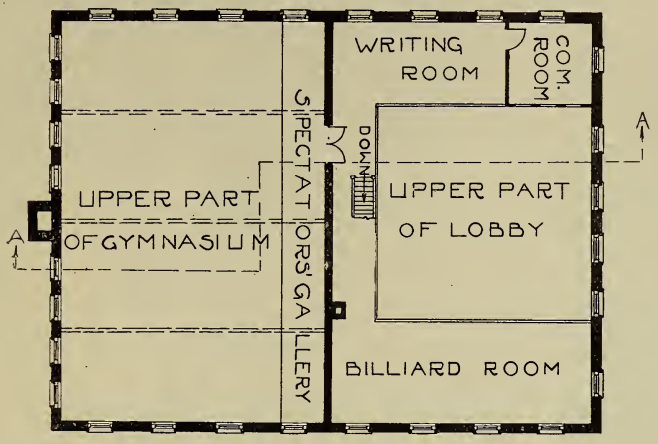


BASEMENT PLAN

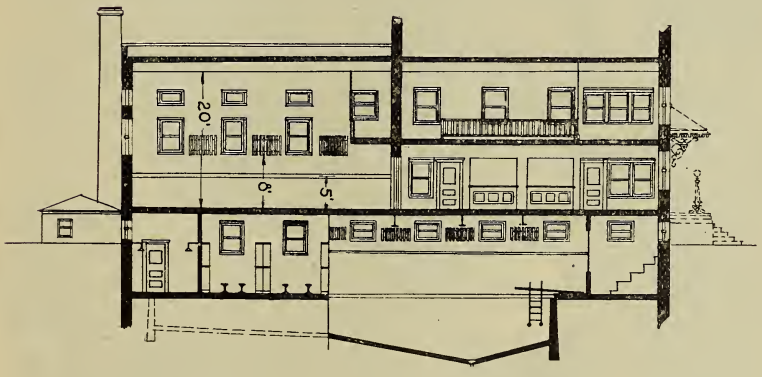


FIRST FLOOR PLAN

Fig. 144. Physical Department Suggestion suitable for small Y. M. C. A.

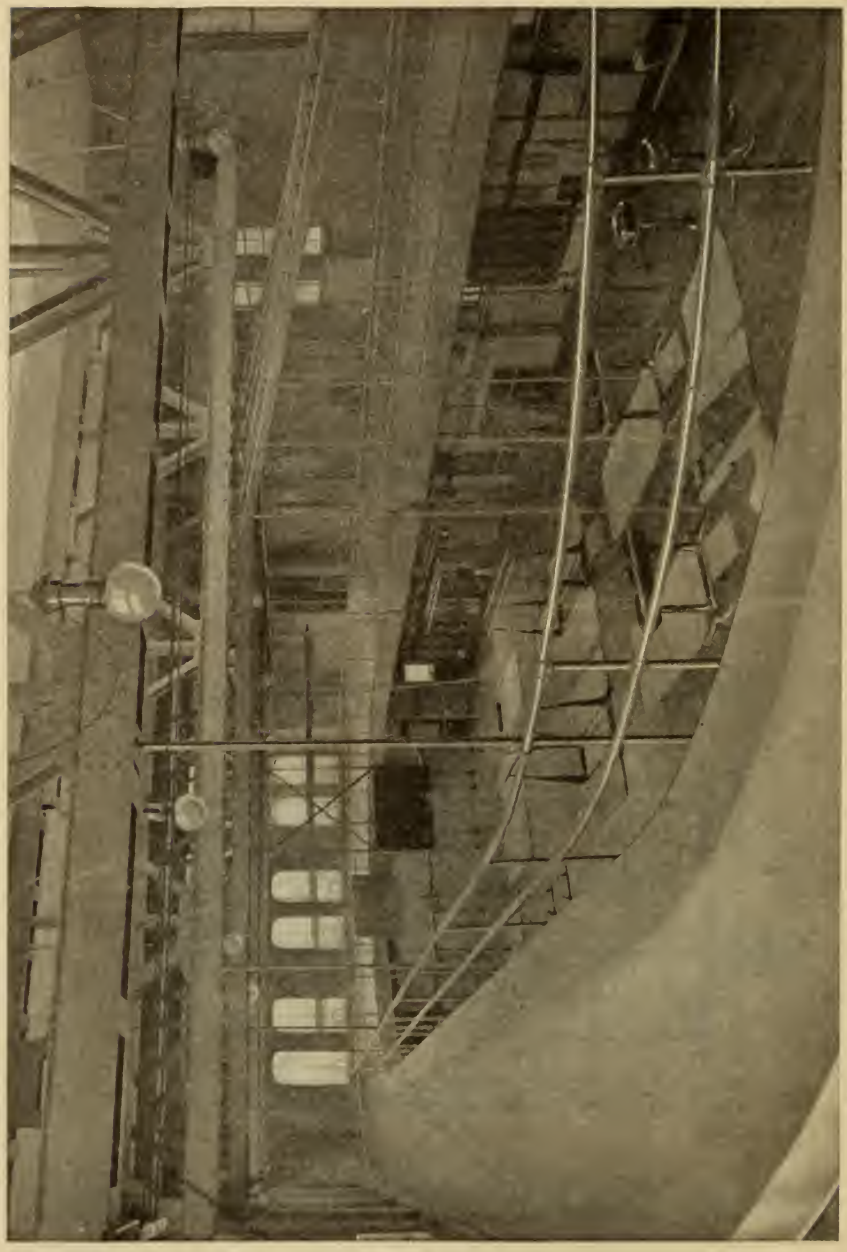


MEZZANINE AND GALLERY FLOOR



SECTION-A-A-

Fig. 14B. This Gymnasium Represents the Smallest Size Advisable. Running tracks are not recommended in rooms less than 50 feet wide.



YOUNG MEN'S CHRISTIAN ASSOCIATION GYMNASIUM, TWENTY-THIRD STREET, NEW YORK CITY

II. RUNNING TRACK.

The indoor Running Track has been slowly evolved from the path marked out on the gymnasium floor of the seventies, to the banked galley track of today. The narrow gallery, usually not wider than 3 or 4 feet, with narrow, canvas-covered running path, has been gradually superseded by wider galleries with concave floors, covered with cork linoleum.

The proper Incline, or Bank, is secured by placing curved sleepers on the rough floor of the gallery and flooring over them, thus forming a Concave Incline. The curvature of the sleepers, and their location, depend on the radius at the ends (or corners), of the track and the required speed.

SHAPE. The shape of most of the earlier track galleries (in plan) was rectangular with rounded corners of short radii. As the limitations of such tracks became apparent, the radii of corner curves were gradually lengthened until the present standard of efficiency was reached in tracks having true semi-circular ends (see Fig. 16). Elliptical (as compared with semi-circular) ends leave a slightly larger free room area for apparatus and games, but for maximum speed, safety and effect on the runner, the semi-circular end tracks are superior.

WIDTH. The width of the room should determine the width of the gallery. The following table shows the general rule.

Width of Room	Width of Gallery	Cover Width*
40 feet	4 feet 6 ins.	4 feet
45 "	5 " 6 ins.	4 " 6 ins.
50 "	6 "	5 "
55 "	6 " 6 ins.	5 " 6 "
60 "	7 to 8 "	6 to 7 "
65 "	8 to 10 "	7 to 9 "

*Unless full width cover is preferred.

Tracks less than 5 feet wide are now rarely constructed. They do not fulfill modern requirements and are therefore not recommended. The gallery widths given in the table are to be considered maximum and should not be exceeded except in special cases. The cover widths indicated apply more particularly to galleries having railings set on top of the track floor. If the railing is attached to the face or front of the gallery, the width of the cover may be 6 inches wider than the figures given in the table.

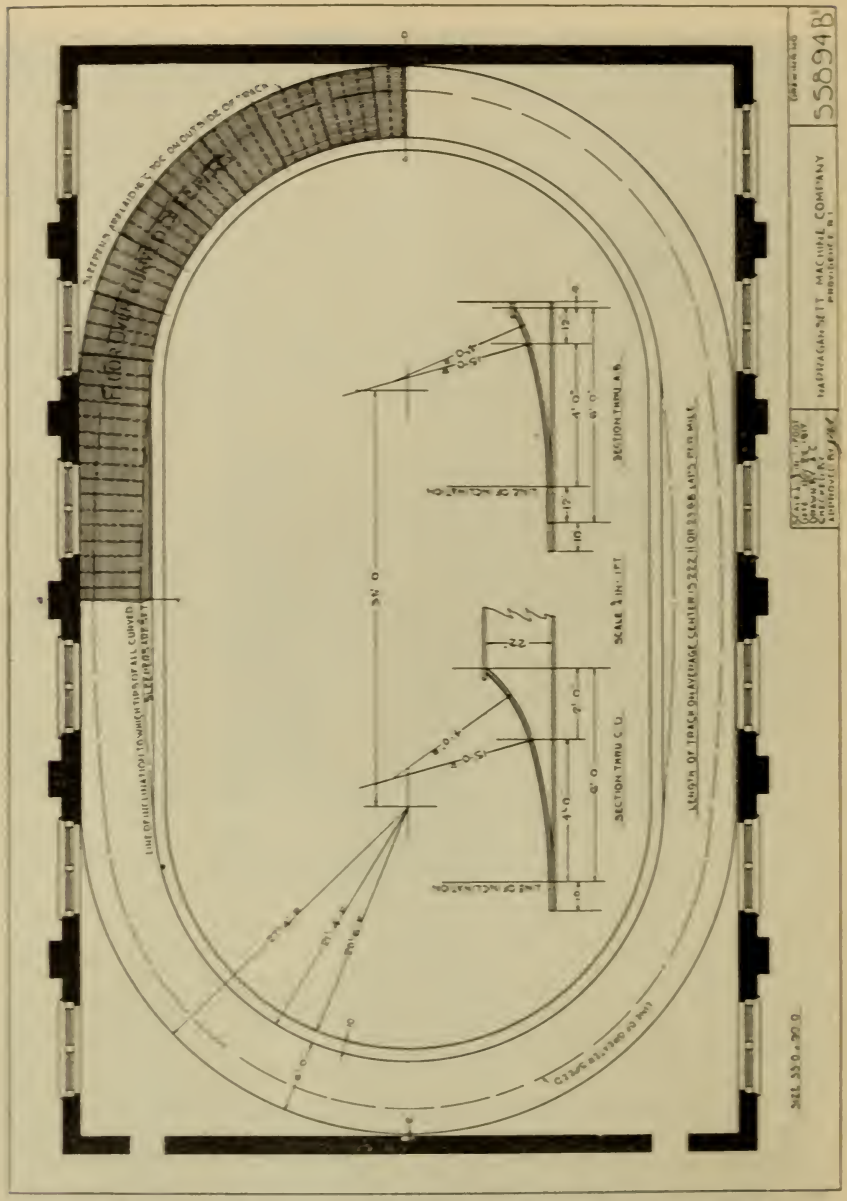
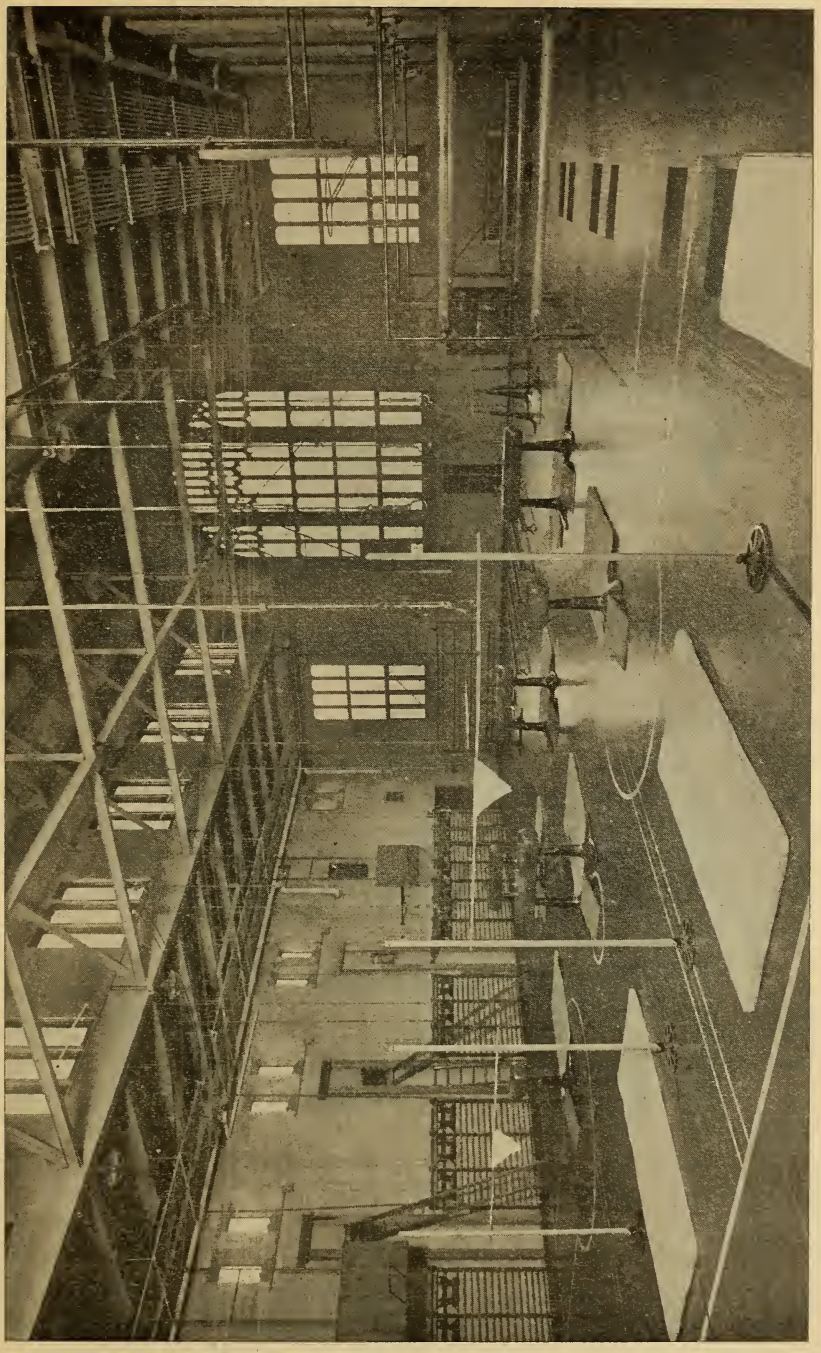


Fig. 16. **Typical Narragansett Machine Co. Track Plan.** These plans are furnished gratis to institutions on receipt of architect's plan showing size, shape and construction of the gallery. We also furnish banking plans showing the size, curvature and location of all curved sleepers. In instances where we furnish the apparatus or track cover, no charge is made for our detail plans.



WOMEN'S GYMNASIUM, NOYES HALL, UNIVERSITY OF CHICAGO

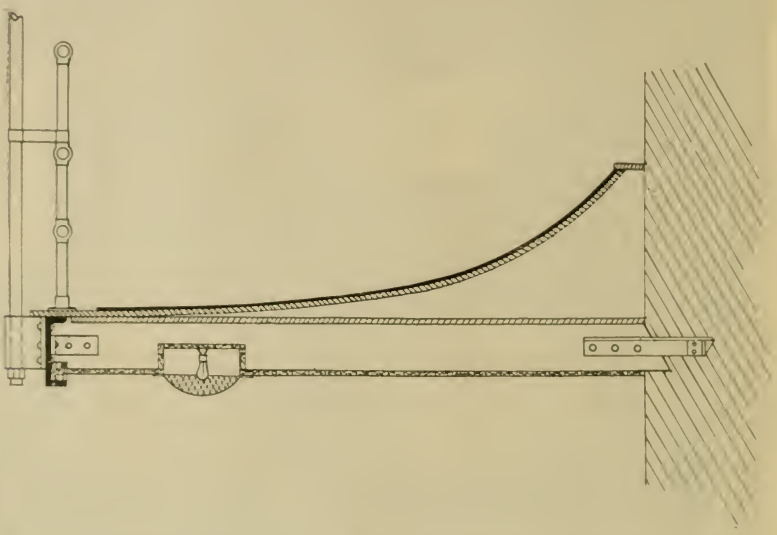
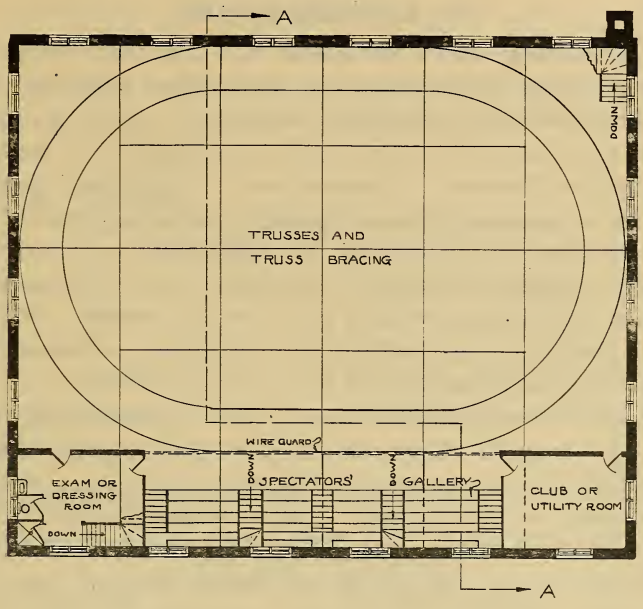


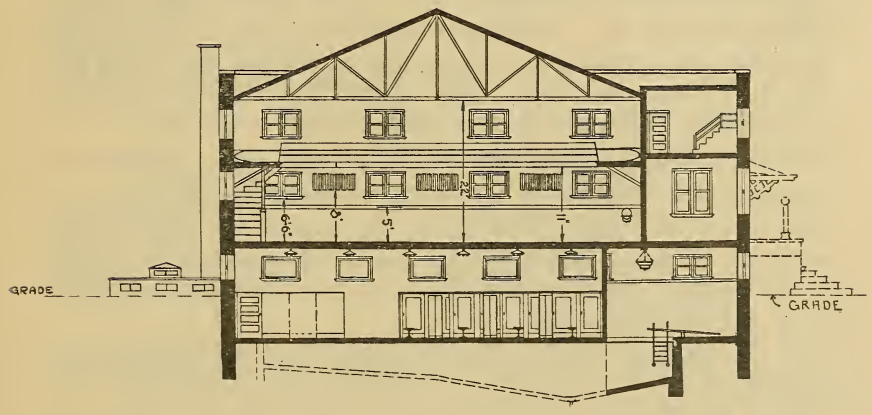
Fig. 17. **Typical Track Section.** Note space between supporting rod and railing; also recessed under-gallery light.

GALLERY SUPPORT. Galleries should be supported either by wall brackets or by rods from overhead beams. Brackets should be carefully planned to secure ample strength and proper spacing. At points where the brackets are anchored, the walls should be laid up in Portland cement. Brackets should be so designed and located as to leave a clear wall space of not less than 8 feet above the floor.

If rods instead of brackets are used, such rods should not form a part of the gallery rail. The rail and the supporting rods should be connected but there should be sufficient space between same to prevent accident in case a runner slides his hand along the rail as he proceeds. (See Fig. 17.) The relative merits of inclined as compared to vertical supporting rods must be decided according to local conditions. Unless a track is unusually narrow, the value of inclined rods is more apparent than real. If inclined rods are necessary, the face of the gallery, as well as the complete gallery frame, must be firmly anchored to the walls. For many reasons bracket support fulfills gymnasium requirements better than rods. That principle is therefore strongly recommended.



TRACK FLOOR PLAN



SECTION - A-A-

Fig. 23B. A Visitor's Gallery (as in fig. 29) may be substituted for the Running Track.

V. LOCKER ROOMS.

Every building, every institution is a law unto itself in the matter of space and arrangement for locker facilities. Unless individual needs and modifying conditions are very carefully studied, in advance, the results will most likely prove inadequate. Structural requirements in general may be stated as follows:

All locker rooms should be located as close as possible to the general entrance of the building (or department) as consistent with necessary demands for privacy, supervision, etc. The avenues of approach should be convenient and direct as possible. All locker rooms should be close to the main gymnasium, and should be on the same floor with baths, toilet rooms and natatorium.

The size of various locker rooms must be determined to meet local requirements. They should have good natural light and ventilation. The most convenient shape for the room is rectangular or as nearly so as possible. Locker rooms should be free as possible from columns, posts, projecting pilasters and similar obstructions. If below grade, the floors should be of concrete with carpet, linoleum or equivalent covering for aisles. Wood floors are satisfactory if the locker rooms are above grade.

Walls should be smooth finished and as free as possible from such obstructions as radiators, water and steam pipes, electric switch cabinets, etc. Windows should be 6 feet or more above the floor; they should have florentine or frosted glass, and provision for opening same (for ventilation) without violating locker room privacy.

Ceilings should be at least 10 or 12 feet high. Bottoms of projecting beams should be not less than 8 feet above the floor.

Radiators or heating coils should be located on walls between windows, (6 feet 6 inches minimum above the floors), or attached to the ceiling. Steam risers should be well covered to a height of 6 feet above the floor.

Floor radiators should be wall recessed and the openings well screened.

Good ventilation without drafts must be provided.

All electric lights should be attached to the ceiling. They should be located over the centers of aisles.

To estimate the approximate number of lockers the average room will accommodate, divide the net floor area by 2 1-2 for double tier, and by 5 for single tier lockers. This rule is based on lockers 12 inches wide by 12 inches deep, and allows required aisle space.

A. DIVISION OF LOCKER SPACE. Modern methods require a division of a total locker space into specialized rooms located, arranged and equipped to meet the particular needs of each general group. The usual scheme of division for various institutions is as follows:

SPECIAL ROOMS.

High Schools, Colleges and Universities.

(See Figs. 27, 24 and 22.)

For Men	For Women
*Attendant's room	*Attendant's room
General room	General room
Home Team room	Individual Dressing rooms
Visiting Team room	Hair drying space or room
Faculty room	

*Other forms of supervision frequently obviate the need for attendants' rooms in High Schools.

Y. M. C. A.'s and Y. W. C. A.'s.

(See Figs. 28 and 29.)

Attendant's room	Attendant's room
General room	General room
Business Men's room (with club room)	Individual Dressing rooms
	Hair drying space or room
Boys' room	
Visiting Team room	
Limited or Special Membership room	

Municipal, Social Center and Church Gymnasia.

(See Fig. 26.)

For Men	For Women
Attendant's room	Attendant's room
General room	General room
Visiting Team room	Individual Dressing rooms
	Hair drying space or room

Present sanitary standards demand clean gymnasium suits. Many, especially large institutions, consider a laundry a part of the regular equipment. Where laundering is handled by outside laundries, a laundry dryer at least will prove advantageous.

B. DIFFERENT TYPES OF LOCKER EQUIPMENT. There are at present three recognized locker schemes or types of equipment, which, considered briefly, are as follows:

1—"REGULAR" (individual). (See Fig. 14).

This is the oldest and probably the largest type. It means simply

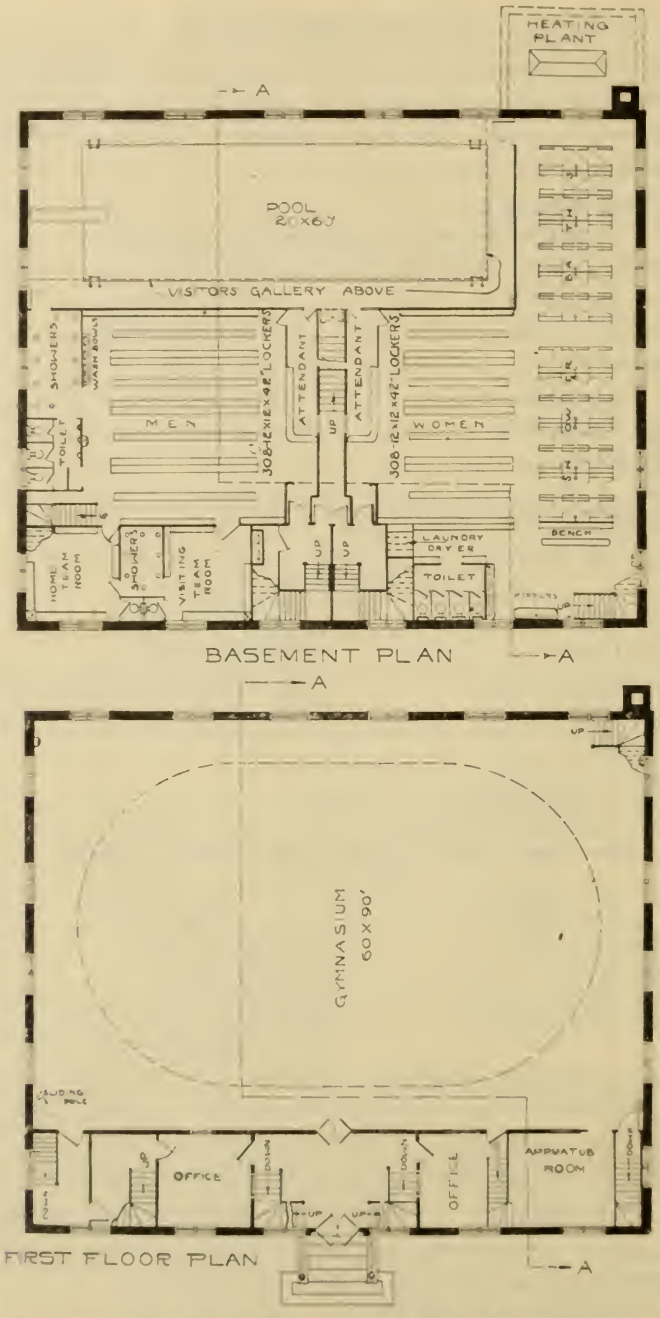
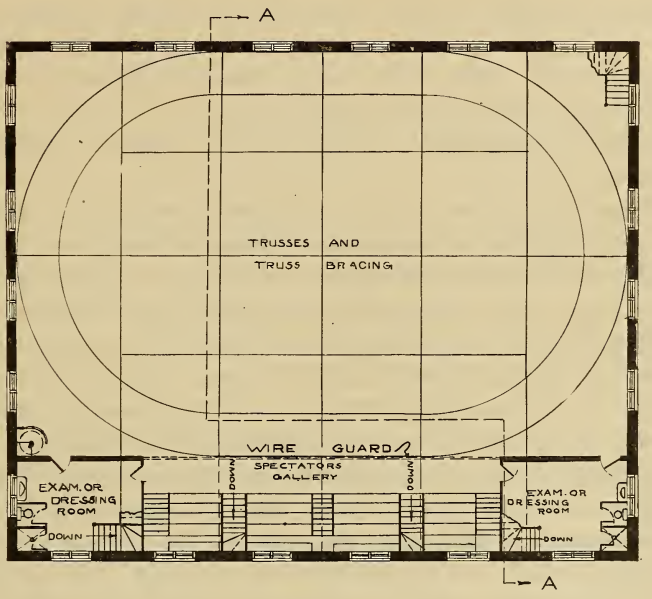
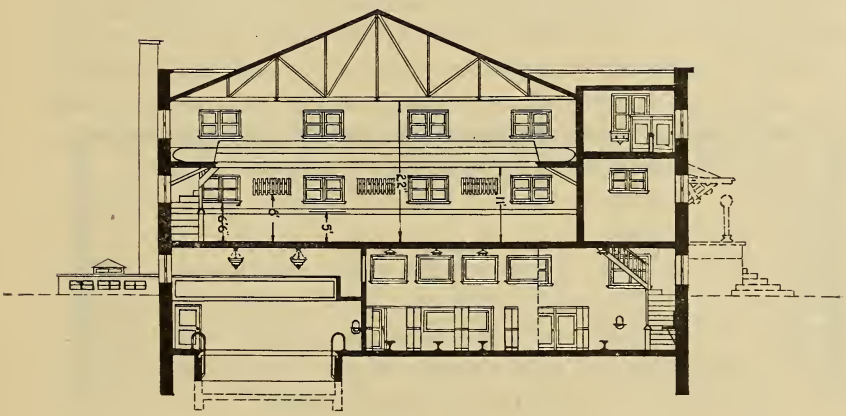


Fig. 21A. Outline of Building for Both Men and Women.



TRACK FLOOR PLAN



SECTION - A-A-

Fig. 24B. Arranged for the Requirements of Small Schools or Colleges. With the addition of an assembly room this layout may be expanded to serve as a community center.

a permanent individual locker for each person using physical department privileges. Such lockers may be equipped with attached key or combination locks, or key or combination padlocks, whichever best serves the particular requirements.

2—CHECK ROOM OR "KANSAS CITY" Plan. (See Fig. 27—Boys' Locker room.)

With this system, there are no permanently assigned or rented lockers. Each member's gymnasium clothing is stored in a small fibre box or wire basket, and stacked on series of shelving in the attendant's room, which must be especially planned for this purpose. Each member on entering the department proceeds to the attendant's counter, and, on identification, is given his box or basket and the key to a vacant locker, which he uses only during his stay in the department. Lockers for this system require a depth of 15 inches. On leaving the department, he returns his box and locker key to the attendant, whose duty it is to see that each suit is laundered or at least dried after each using. Thus it will be seen, only enough lockers are required to accommodate the greatest number of individuals using the department at the same time.

The Kansas City System requires the smallest actual locker space, but the largest attendant's (storage) room of any system. If all locker rooms cannot be served from a common attendant's or storage room, a separate attendant and store room is required for each locker room. Unless each member is supplied with an individual combination padlock (the same one always using the same lock), this system requires lockers having attached key locks. It is most frequently used for boys and men, but may be employed also for girls and women.

3—SELF SERVICE (or Box Locker) System. (See Fig. 27—Girls' Locker room.)

Like the Kansas City scheme, this system also requires only a sufficient number of dressing lockers to accommodate the maximum number of individuals using the locker room at the same time. The essential difference between this and the check room system is that each member is provided with a small locker (12 inches wide by 15 inches deep by 12 inches high, built in cabinets six tiers high), in which he keeps his box (or basket) containing his gymnasium suit. These small lockers are therefore, called box lockers. Each box locker door is secured by means of a combination padlock. The regular or dressing lockers must be 15 inches deep and may

be single or double tier in height. The dressing lockers have no attached locks, but are fitted for padlocks.

With the self service system each member on entering the department gets his box or basket from his box locker and takes same to any vacant dressing locker, which he locks with the same combination padlock brought from his box locker. After exercising, bathing and dressing, he returns his box to his box locker, which he again locks with the combination padlock, thus having served himself and avoided the inconvenience of carrying a key during exercising, bathing and swimming.

To enable an attendant (or night man) to remove the soiled gymnasium suits for laundering or drying, and for replacing same, without operating each individual combination lock, each cabinet of box lockers is provided with a master locking mechanism, whereby as many as 72 box locker doors may be unlocked or locked by the shifting of a single control lever. Attached to the inside of each box locker door, there is a signal device which the member automatically shifts in opening the door. In this manner, the attendant on making his rounds, sees at a glance just which box lockers contain used clothing requiring his attention. On returning each cleaned suit, the attendant sets each signal to "unused" position and by means of the master locking device, again locks all doors, ready for use the next day. If a clean towel is replaced with each clean suit, towel service is accomplished without the means of a towel clerk. The self service plan is more expensive to install but more economical in operation than the check room system.

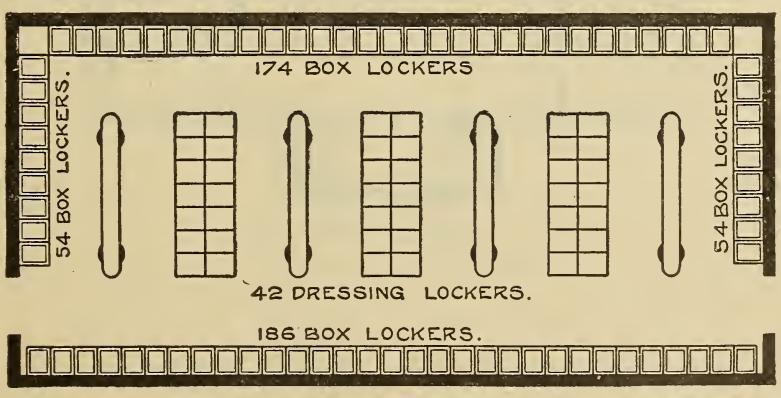
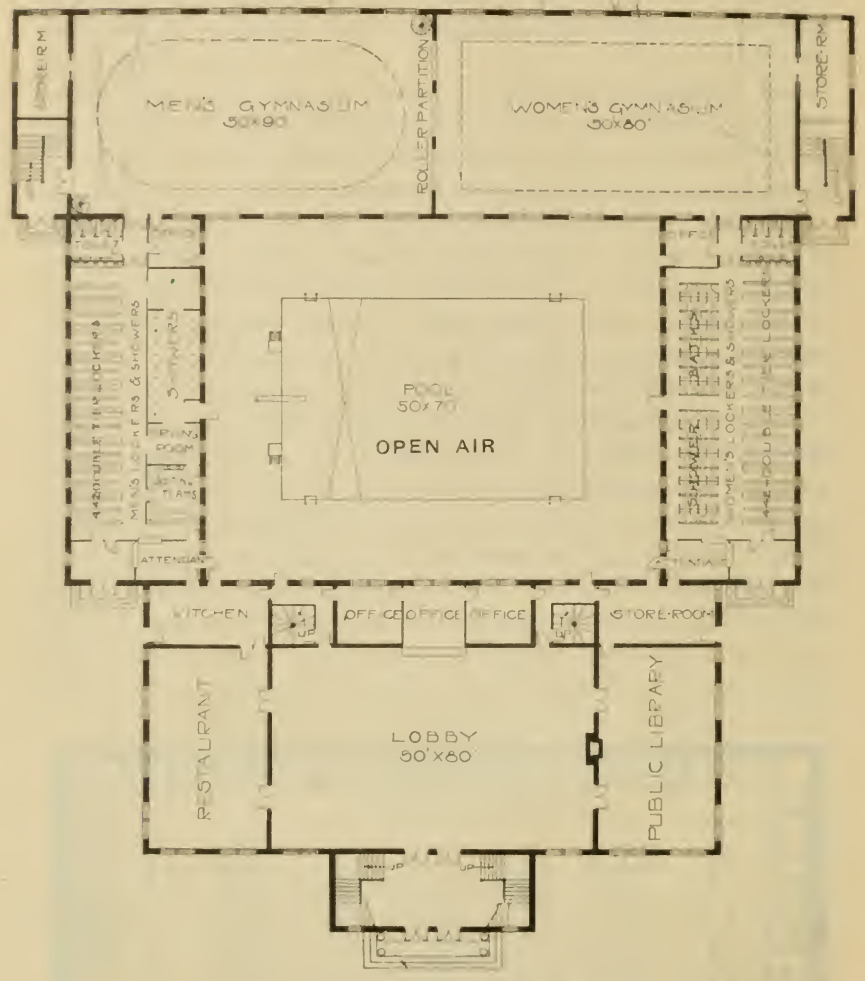
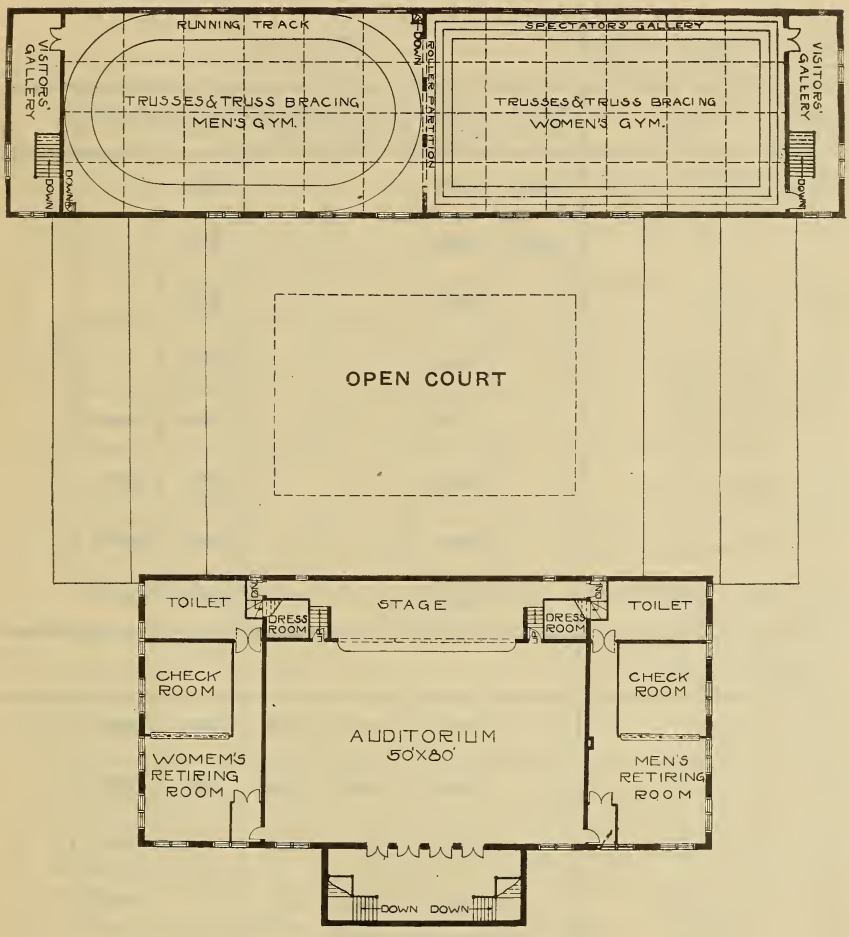


Fig. 25. A Self Service Equipped Locker Room. 468 Box Lockers and 42 Single Tier Dressing Lockers. This space would accommodate 120 ordinary one-tier Lockers,—240 two-tier.



FIRST FLOOR PLAN

Fig. 26A. Building Scheme for Large Community Center or Playground Field House



SECOND FLOOR PLAN

Fig. 26B. The Buildings are Arranged to Screen and Afford Control for the Open Air Swimming Pool.

C. STANDARD LOCKER SIZES.

There is no fixed size of lockers for any particular group. Lockers are made in 16 standard sizes. The following table indicates the locker sizes most commonly furnished for various groups:

STD. LOCKER SIZES	GROUPS						
DOUBLE TIER.	BOYS	YOUNG MEN	ATHLETIC TEAMS	BUSINESS MEN	GIRLS	WOMEN	
12 × 12 × 36"	—	—			—		
12 × 15 × 36"	—	—			—		
15 × 12 × 36"		—			—		
15 × 15 × 36"		—			—		
12 × 12 × 42"		—			—	—	
12 × 15 × 42"		—			—	—	
15 × 12 × 42"		—			—	—	
15 × 15 × 42"		—			—	—	
SINGLE TIER.							
12 × 12 × 60"		—	—	—	—	—	
12 × 15 × 60"		—	—	—	—	—	
15 × 12 × 60"		—	—	—		—	
15 × 15 × 60"		—	—	—		—	
12 × 12 × 72"			—	—		—	
12 × 15 × 72"			—	—		—	
15 × 12 × 72"			—	—		—	
15 × 15 × 72"			—	—		—	

The wide range of sizes here indicated for each group is due to the various combinations of space and financial limitations. Without these limitations, and except for boys' use, probably no double tier lockers would ever be selected.

Advisable aisle widths vary with varying situations. Between cabinets composed of lockers 12 inches wide, the aisle should never be less than 3 feet 6 inches. Wider lockers (having wider doors), require proportionately wider aisles. For average conditions a uniform aisle width of 4 feet 6 inches or 5 feet is recommended.

Aisles used as passage ways (not as dressing space) should not be less than 4 feet wide. Aisles serving both as passage ways and dressing space should be at least 6 feet wide.

Long benches (supported by special iron pedestals), permanently attached to the floor, have proven more satisfactory than portable benches or stools. However, portable stools are preferable for faculty and business men's rooms. Aisles 6 feet wide or more will accommodate two parallel benches. The space between benches arranged in this manner and the fronts of lockers should be not less than 18 inches. Aisles less than 6 feet wide will take only one central bench. Bench seats or boards should be from 7 inches to 8 inches wide with a height of 16 or 17 inches above the floor.

D. WOMEN'S (LOCKER ROOM) DRESSING ROOMS. Locker rooms for women should be provided with individual dressing rooms. They should be about 4 feet by 4 feet square and never less than 3 feet 6 inches by 3 feet 6 inches. Each individual dressing room should be provided with clothing hooks, a seat or stool, and a door, though curtains will sometimes serve instead of doors. The number of such dressing rooms should depend upon the size of the largest class to be handled. For classes averaging forty, there should be at least twenty dressing rooms; one for each member is ideal. Dressing rooms connected with individual shower baths are preferable when such arrangement is possible. (See Fig. 23).

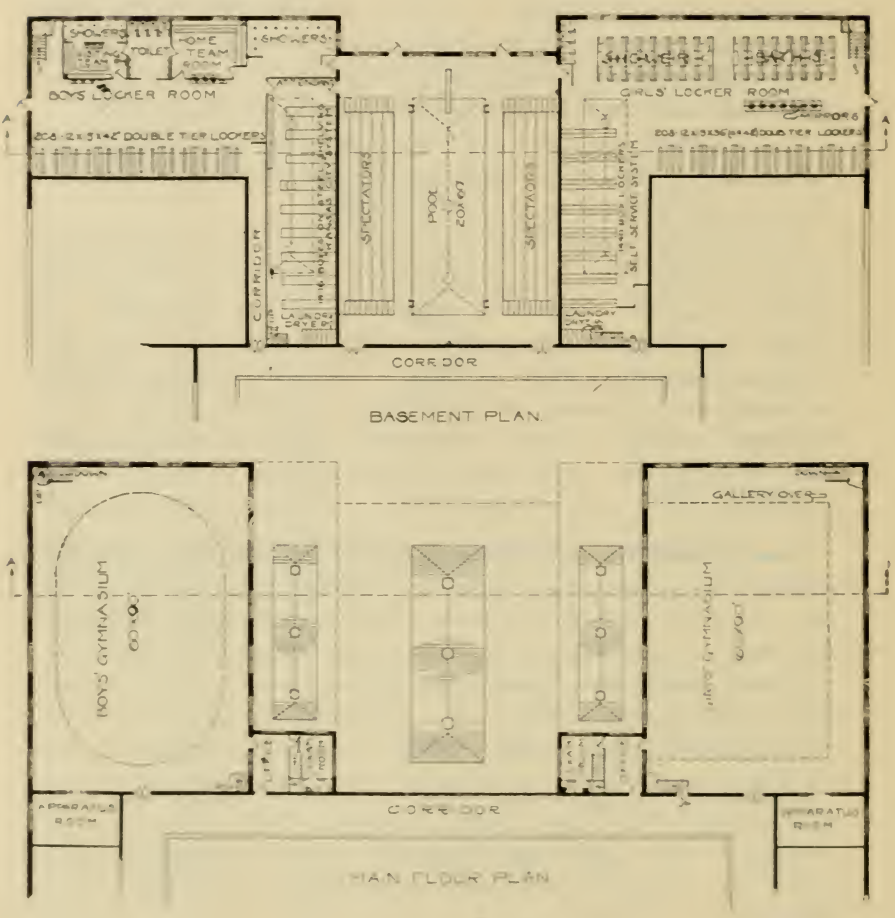
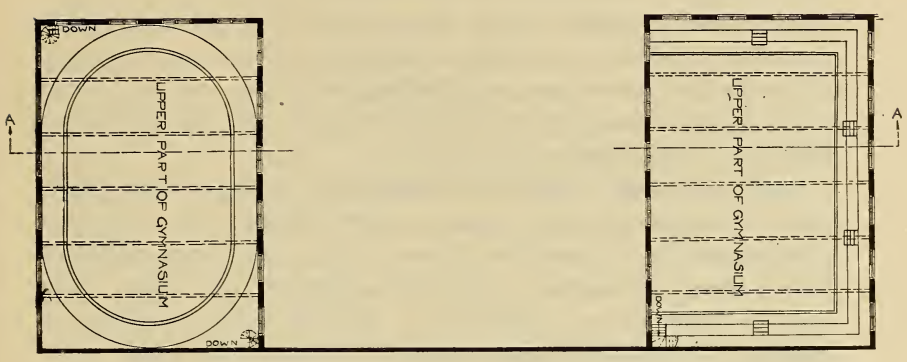
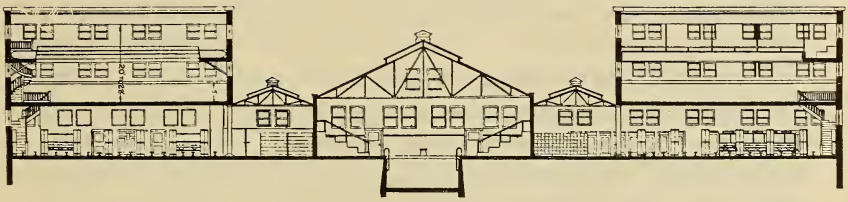


Fig. 27 A. Department of Physical Training for Large High Schools.



TRACK AND GALLERY PLAN.



SECTION - A-A-

Fig. 27B. The Boys' Locker Room Illustrates the Check Room,—or Kansas City,—Plan: the Self Service System is Shown on the Girls' Side.

VI. BATHS.

A. GENERAL REQUIREMENTS. The only type of bath here considered is the shower. Tub baths are obsolete. Turkish baths are advisable in some institutions, but the electric light cabinet has largely supplanted the steam and hot rooms.

As a rule, a separate bath room must be provided for each group of individuals for which a separate locker room is needed. If gymnasium attendance and bathing privileges can be limited to one group or class of individuals at a time, one bath room may serve for more than one group.

Each bath room should be located with regard to the locker room it serves and the entrance to the Natatorium. The best arrangement is to have the shower room open direct from its locker room, serving as a connection between the locker room and the Natatorium. (See Figs. 7 and 28). The next best is the shortest possible distance from both its particular locker room and the Natatorium. Bath rooms should be so located as to receive outside light and ventilation through windows or skylights. It is a great mistake to put baths in whatever dark, misfit space is left over. They merit the careful planning necessary to make them light, attractive and sanitary. All bath rooms should be entirely closed; otherwise steam and moisture will permeate locker and other rooms.

No single rule for bath room size is possible. It depends on individual requirements. An open room will accommodate more showers and bathers than one with a stall for each shower. Except for women, and possibly a few for business men, the stall arrangement is unnecessary and is being discarded. If possible, have a drying room (furnished with seat and towel hooks), between the locker and shower room. There should be no seats in the shower rooms.

Bath rooms should embody only those appointments and characteristics which are conducive to cleanliness. Floors, walls and ceiling should be finished white, for which the best materials are tile, glazed brick and marble, the floor tile having an effective, non-slip finish. Many serious accidents have resulted from falls on wet, soapy, smooth finished tile floors. Instead of the ordinary central floor drain, arrange the pitch of the floor so the water will drain from the center of the floor toward the walls, at which intersection there should be narrow drain troughs or gutters. If

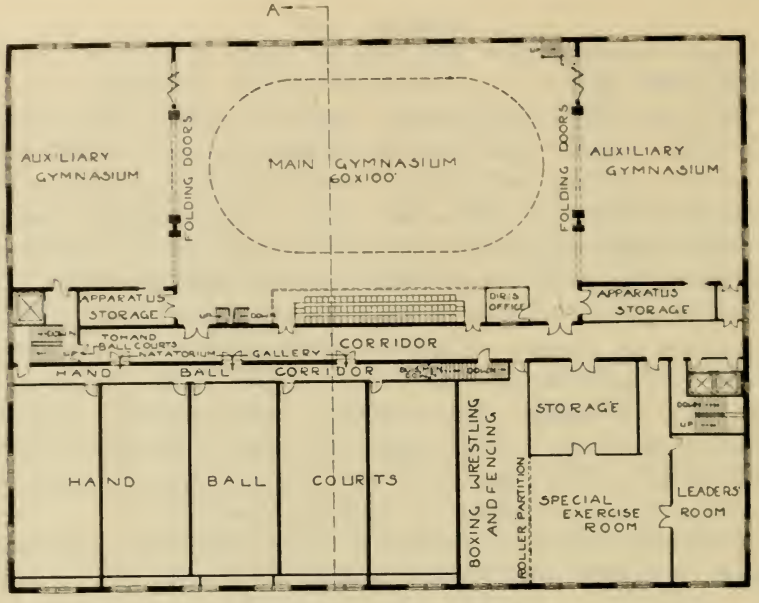
properly developed, this plan will be found far superior to a central floor drain.

The lower sills of all windows should be at least 6 feet above the floor. Unless wood trim is exceptionally well treated and covered it will soon swell and rot. For this reason, as little wood as possible should be used in bath rooms. Metal window frames and sash, metal door frames and metal covered doors are relatively expensive, but deserve investigation before selecting wood. It should be possible to open windows for ventilation without violating bath room privacy. Radiators and heating coils, if exposed, should be placed on the walls 6 feet or more above the floor, or attached to the ceiling. The certainty of rapid rusting, of exposed radiators and other ordinary pipe and fittings, constitute a very good reason for the adoption of some heating method which does not require exposed radiators in the bath rooms.

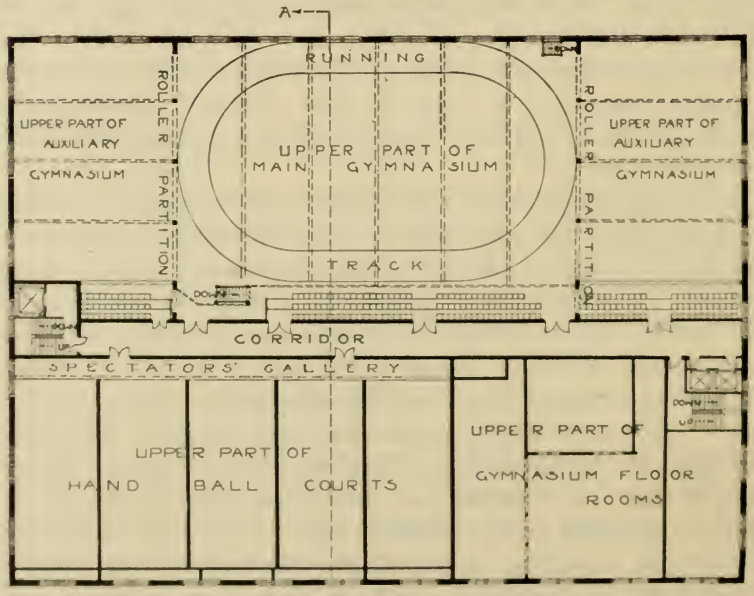
All metal shower fixtures should be brass, with nickel or polished finish. Porcelain valve handles usually break and cause trouble. If possible, no parts of the showers should be exposed except the head and valve controls. This treatment requires a pipe space behind shower room walls large enough to permit inspection and repair of enclosed parts. If water pipes must be exposed, they should extend from the ceiling (or overhead) down to the point of control, instead of up from the floor. Shower control handles are usually located too low. They should be set about chest height above the floor.

For the great majority of institutions, the individual control of water temperature by each bather is more satisfactory and practical than by a central or master control system operated by an attendant. There are many arguments for and against single control, anti-scalding valves. Where such valves are not used, the water heating plant should be provided with one of the several devices whereby water above a safe bathing temperature cannot enter the main or feed pipes supplying the individual showers. With such provision, the use of ordinary bath tub valves is safe. Shower heads of the "rain" variety use more water but do not clog as quickly and easily as the "needle" type. The outlet face of all shower head should be detachable for cleaning and the removal of sediment accumulation. Shower heads with swivel or ball joint connections are unnecessary (at least for men and boys) and are sure to leak.

The question of hot water supply heaters, etc., are technical matters and should be handled by specialists.

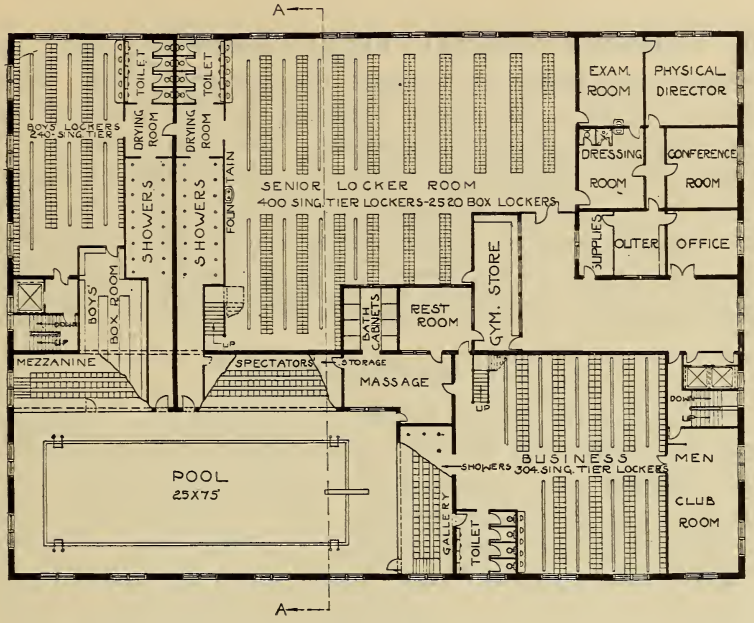


GYMNASIUM FLOOR PLAN

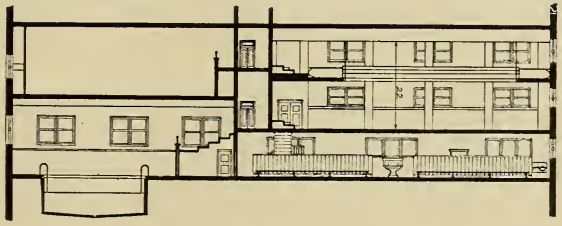


TRACK FOOR PLAN

Fig. 28A. Suggested Physical Department Layout for a Large Y M. C. A.



LOCKER FLOOR PLAN



SECTION -A-A-

Fig. 28B. For comparative purposes, the recognized three distinct locker systems are here shown; Business Men,—Regular (individual); General Room, —Self Service; Boys' Room,—Check Room Plan.

B. WOMEN'S SPECIAL REQUIREMENTS. Small individual shower rooms are necessary for girls and women. They should be about 4 feet square, arranged between corresponding rows of communicating dressing rooms. (See Figs. 23 and 27).

Valves for controlling such enclosed showers should be located on one of the sides or partitions, about chest height above the floor. Also the heads of showers for women should be adjustable or set at an angle so the bather stands in front of, rather than under the shower. This is necessary to keep the bather's hair dry.

VII. NATATORIUM.

Here again is the call for sunlight and cleanliness. If possible, locate the Natatorium out from under the rest of the building, with a skylight roof, or if it must be under another floor, place it on the sunny side of the building. One of the most gratifying developments in gymnasium construction is the large percentage of sunlit swimming pools. Many buildings may be arranged with a large central light court which, though the Natatorium be in the basement, allows a large skylight area over a good portion of the pool. The growing popularity of aquatics is indicated by the increasing number of swimming pools having commodious spectators' galleries.

In point of location, proximity to all bath rooms is essential. Except for spectators, there should be no way to get into the Natatorium other than through a shower room. A thorough bath should precede every swim. There should be no baths in the Natatorium.

The size of the pool proper is practically standardized at 60 feet long by 20 feet to 30 feet wide. A larger pool is sometimes advisable while a pool less than 40 feet long is too short for practical results. The Natatorium (or room in which the swimming pool is located) should be not less than 12 feet longer and 10 feet wider than the size of the pool. (See Fig. 30). A clear floor space of 15 feet between the deep (or spring board) end of the pool and the wall at that end of the room, with a uniform floor space 10 feet wide around the other three sides closely approximates the ideal.

The ceiling (or beam) height should be not less than 12 feet. A ceiling high enough to accommodate a spectators' gallery and the provision of such gallery, are both advisable. The day of the

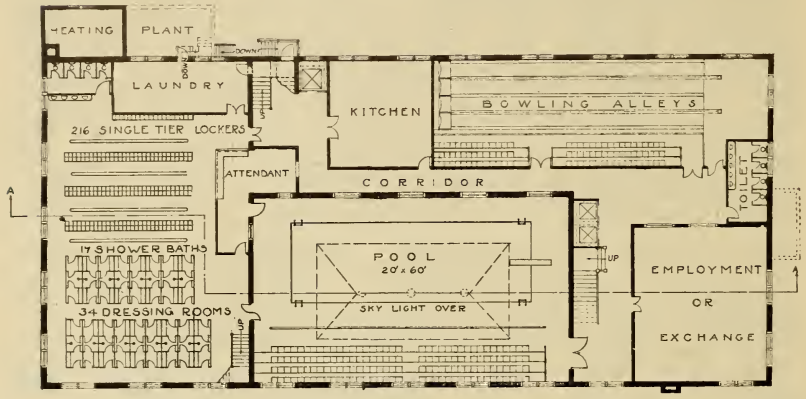
odoriferous pool in a dark, damp room with an oppressively low ceiling, is past.

The Natatorium requirements for white tile floors, walls, and ceiling are identical with those of the shower room, previously described. Here again, the floor tile must be of the non-slip finish. The rule for window and radiator heights and their treatment is also the same as for shower rooms. Floor radiators should be recessed into, and flush with walls, with all such wall openings carefully screened. If exposed radiators cannot be avoided, they should be located on the walls (not less than 6 feet above the floor), or on the ceiling. Exposed steam risers should be carefully covered to a height of 6 feet above the floor. All projecting corners should be given a generous round.

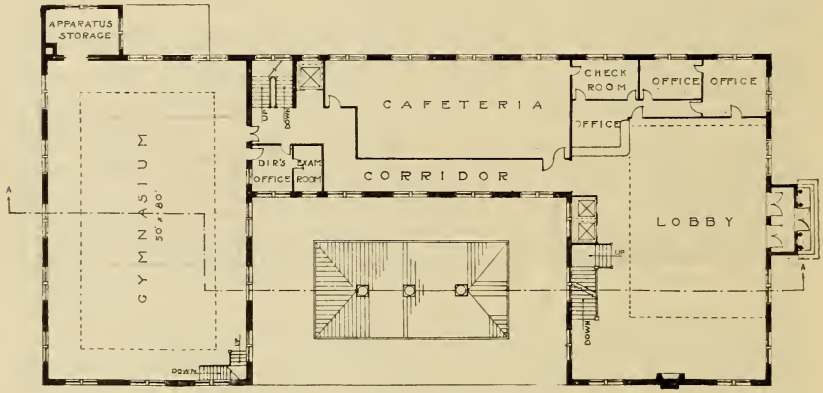
The floor around the pool should have only sufficient pitch to carry off the water which would otherwise accumulate. The direction of drainage is preferably toward the walls (away from the pool) to a narrow drain trough or gutter, as suggested in connection with shower room drainage. If possible, there should be no elevated curb around the pool.

The necessity for unusually heavy water proofed concrete construction for the pool bottom and walls is generally well understood. An open space or tunnel all around outside the walls of the pool will prove valuable for various reasons. The pool should be lined with white tile or glazed brick. All around the walls and slightly above water level, there should be a recessed scum or drain trough, molded into the heavy porcelain tile sections specially constructed for this purpose. (See Figs. 30 and 31). The bottom of this drain trough should have frequent (screened) connections with a good-sized drain pipe connecting with the sewerage system. This trough should also be deep enough to prevent the contents of same being washed back into the pool.

The deepest point of the pool should be from 2 to 3 times the distance of the spring board overhang,—in from the wall at the deep end, which, in a 60 foot pool usually amounts to from 12 to 15 feet with the average closer to 12 feet. (See Fig. 30). The shorter the pool, the farther back the board may be set with a correspondingly shorter distance between the deep point and the wall at the end. The depth of water usually averages from 3 feet 6 inches or 4 feet at the shallow end to 8 feet at the deepest point, with a depth of about 6 feet at the deep end wall.

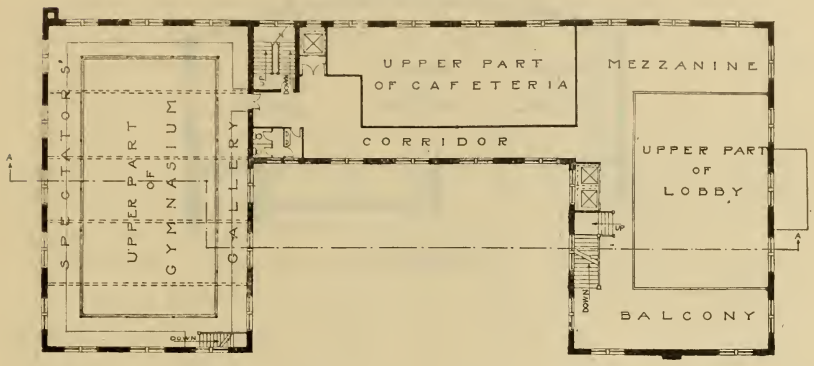


BASEMENT PLAN

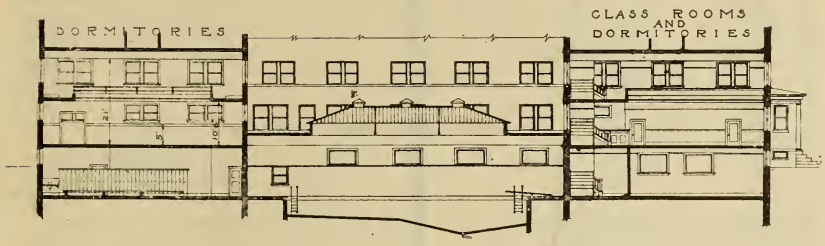


FIRST FLOOR PLAN

Fig. 29. The Above Sketches are Designed to Show Typical Y. W. C. A. Requirements.

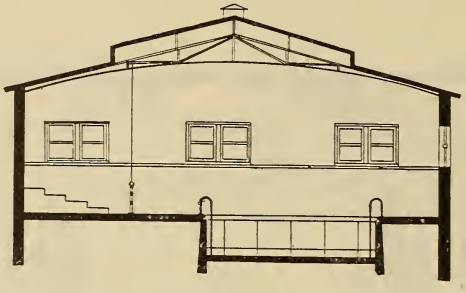


MEZZANINE FLOOR PLAN



SECTION A-A

Fig. 29B. We Furnish Suggested Apparatus Lists and Equipment Plans adapted to any of the Gymnasia Represented in this Book. See pages 72 and 73.



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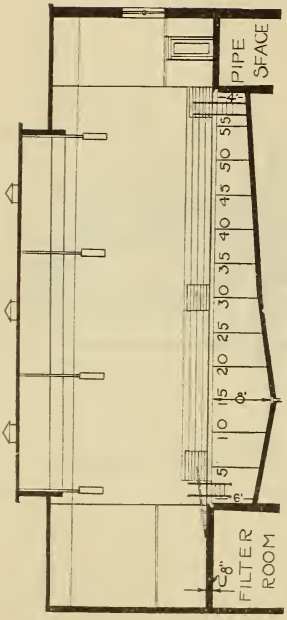

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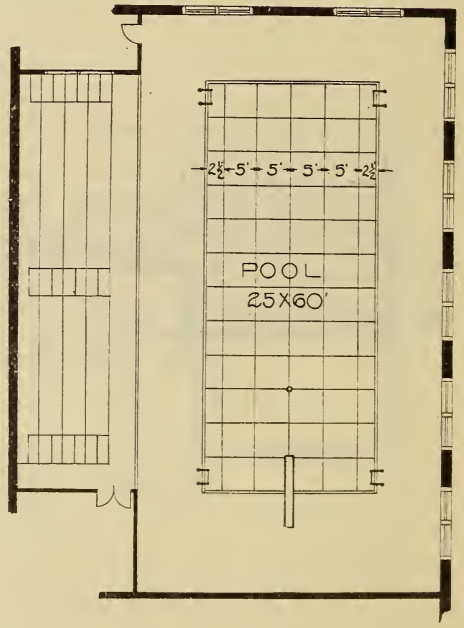


PLAN

Fig. 30. **Various Natatorium Details.** Spring Board anchors should be set when the concrete floor is poured. Note direction lines on the bottom and on end walls, and the distance margins on the side walls of the Pool.

Direction and warning lines (see Fig. 30) formed by black tile or other good contrasting color, should run lengthwise the bottom of the pool. Along the side margins of the pool, there should be distinct depth readings in different colored tile, every five feet. Also for competitive swimming purposes it is convenient to mark the sides of the pool just above the water in yards or feet, starting at the deep end.

In each corner of the pool (or at least at each end) and attached to the side walls, there should be a strong brass ladder with flat brass scored treads; or a series of recessed openings in specially formed tile, to serve instead of brass ladder.

The length of the standard spring board, for pools in general, is 10 feet 6 inches. (See Fig. 31). The official Intercollegiate Spring Board is shown in Fig. 32. Strong floor attachment is effected by means of specially constructed anchors, set flush with the top of the finished floor. The board is bolted to the anchors with heavy brass machine bolts, by the removal of which the board may be easily taken away for special occasions. All exposed metal parts of the board are brass. (Any exposed iron fittings will rust and stain the pool.) The spring board anchors require a floor thickness of 8 inches. They should always be secured in advance and carefully set according to plan, *when the floor is poured.*

An overhead swimming instruction cable, or track, with trolleys for suspended belts (to support beginners), is a valuable piece of equipment. (See Fig. 33).

Another recent development is the so-called Shepherd's Crook—a very effective life-saving device,—surer than throwing a life preserver. It consists of a long, light pole, to one end of which is fitted a hook large enough to go around the body. The length of the pole (usually 14 feet) should be a little longer than half the width of the pool. If the pool is not accessible from both sides, a jointed or extension pole is necessary.

The installation of a trapeze or rings over the water is not advisable. The circumstances under which they are used involve too great an element of danger. However, where such equipment is required, the demands for overhead attachment facilities are the same as previously covered under the heading of attachment for suspended apparatus from the ceiling or beams in the main gymnasium. A fountain cuspidor should be recessed into one or both end walls of the Natatorium.

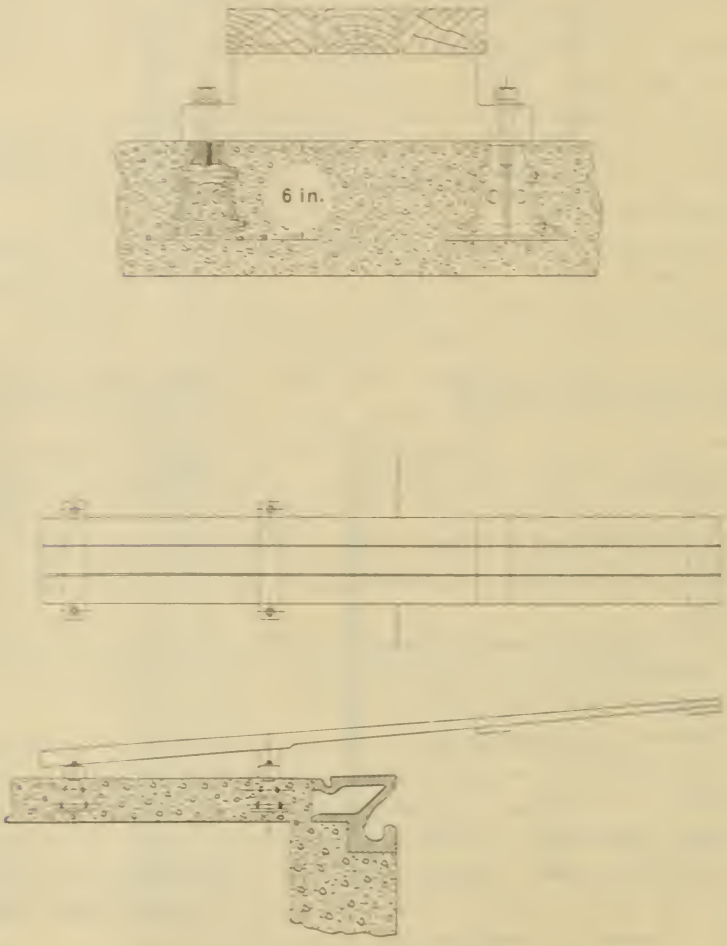
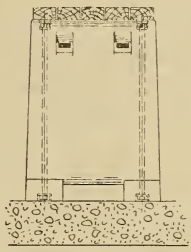


Fig. 31. **Standard Natatorium Spring Board.** The Board should be ordered in time to permit the setting of the anchors when the concrete floor is poured.



SECTION-A-A

Anchors are set 6 in. deep. Floor should be 8 in. thick.

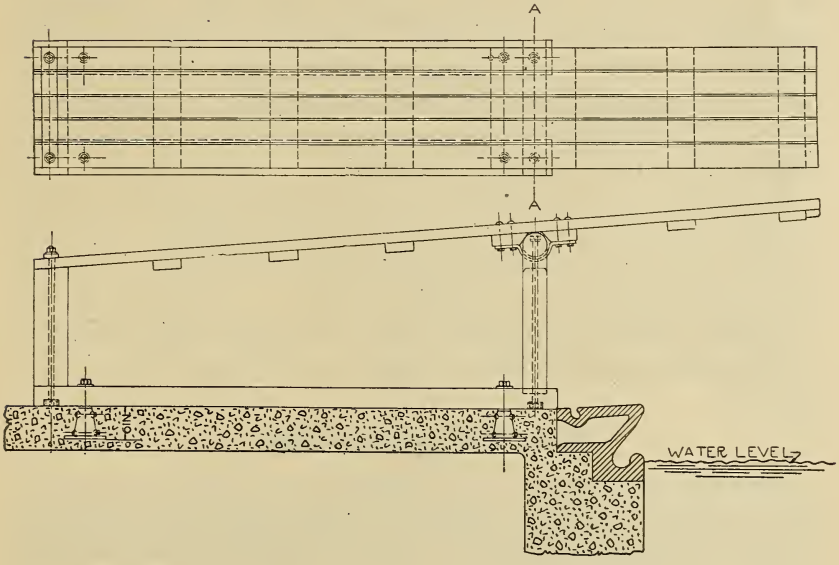


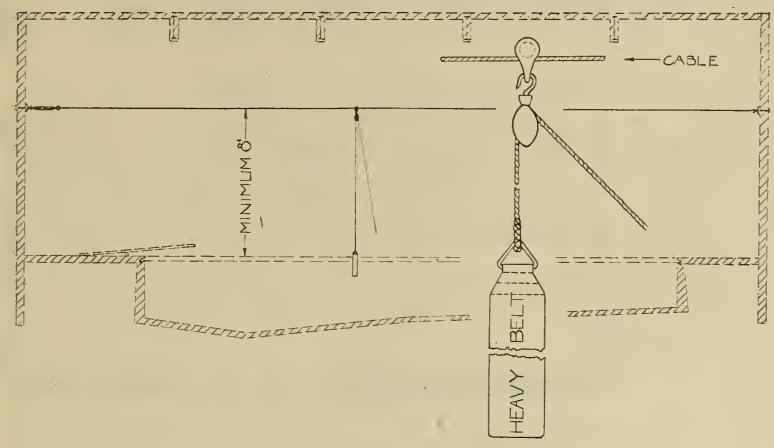
Fig. 32. **Official Intercollegiate Spring Board.** The use of this board requires a clear ceiling height of 12 feet minimum.

Architects have at hand or can secure necessary information to properly handle such technical matters as hot water supply, heaters, filters, sterilization, etc. The demand for clean, transparent water is so general that the use of filtered water should not be questioned. A filtration or refiltration system is recommended as part of standard equipment. In the long run it is usually an economy. Water sterilized by the Ultra Violet Ray process and cleaned by circulation through a refiltering plant, produces the finest results to date. At all hazards, swimming pool water should be clean and safe at all times. In this day and age, unsanitary, bacteria-laden water amounts to almost criminal negligence. Any institution which does not keep its swimming pool clean, should be closed and investigated by the Board of Health as a probable source of disease and infection. Unless an adequate system for refiltration of the pool water is installed, *and effectively operated*, swimming pool water should be changed once a week. In case of failure of filtration system, the following treatment will keep the water safe and free from a dangerous percentage of bacteria: one pound of chloride of lime (one-third available) to every forty thousand gallons (five thousand cubic feet) or one-quarter pound to each average foot of depth in a 25 foot by 60 foot pool. The less sunshine reaching the pool, the higher will be the percentage of bacteria.

Unless the overhead beams are unusually high, electric lights should be attached to, or suspended from the ceiling. The use of indirect or semi-indirect lighting fixtures will greatly increase the attractiveness of the lighting system. In rooms having mezzanine galleries projecting from the walls, it will probably be necessary to have additional lights on the under side of such galleries.

VIII. TOILET ROOMS.

The only consideration of this subject here necessary is to urge that a sufficient number be supplied. There should be an adequate toilet room closely connected with each separate locker and bath room. A general toilet, (usually one for each sex) will be found necessary for most gymnasium buildings.



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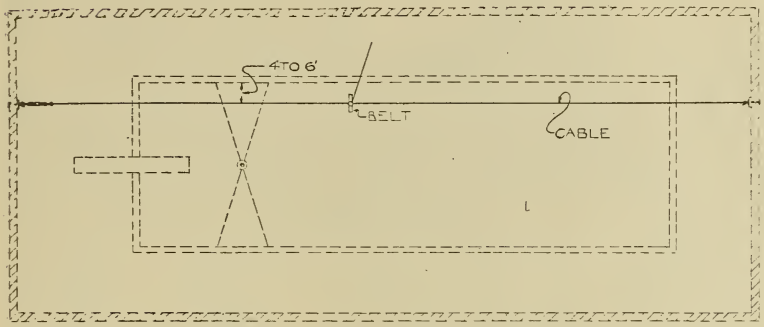
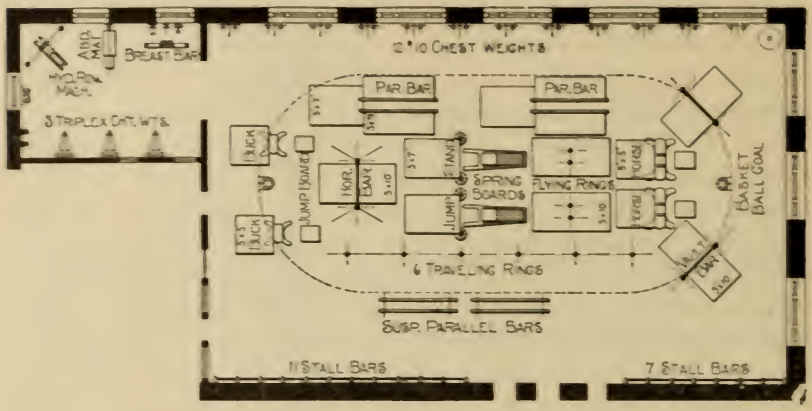


PLAN

Fig. 33. **Swimming Instruction Belt on Cable.** The best is made of heavy webbing and fitted with shoulder straps. The pulleys which ride the cable and support the control rope, are brass. A turn buckle supplies necessary tension to the galvanized cable.

Rigid Track for Swimming Belts. An elliptical steel track, instead of the straight cable, is preferred by many Instructors. The track is usually "I" beam in section; the size corresponds in general to that of the Pool. Such tracks are not furnished as an item of Gymnasium equipment. Each one must be made to fit the particular requirements of each Pool and should be handled as part of the building.

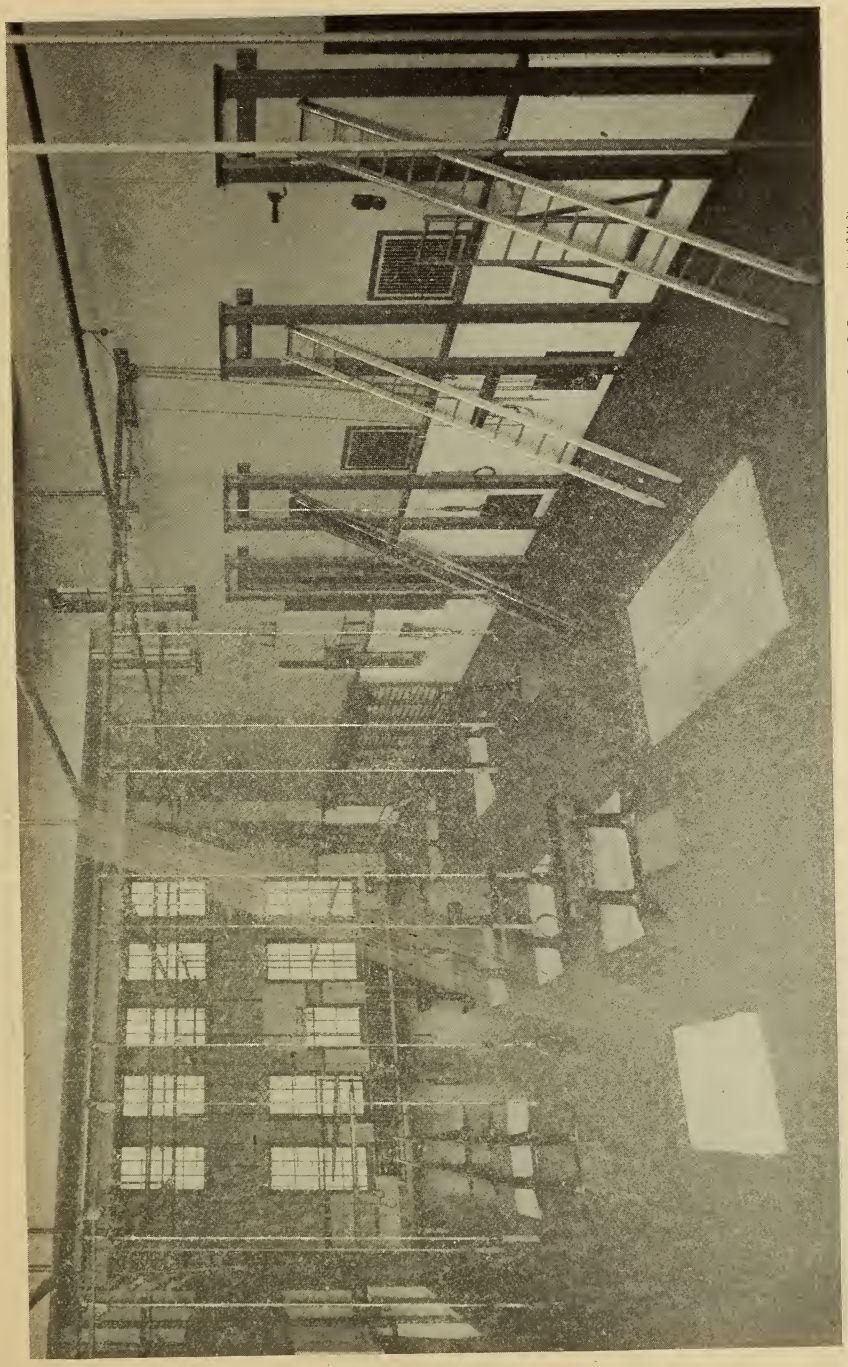


SPECIAL PLANS AND LISTS.

These Special Plans embody the experience of several years in fitting Gymnasia, and although they are gotten up at considerable expense to us we will furnish them free of charge, only asking that our claims for superiority of our apparatus be given careful consideration. They enable the matter of Gymnasium furnishing to be placed in convenient form before a committee for their consideration, revision, etc

To make these plans we require full dimensions of the Gymnasium, height of gallery and railing, the location of the beams overhead and all windows, doors, etc. Generally the architect's plans contain all we need, and if desired, copies sent to us could be returned next day. The more complete the information we receive, the more value our plans and lists will have to intending purchasers

When ready for Estimates on Equipment, send us plans as noted above, and we will make Plans showing the arrangement of Apparatus, Lockers, Alleys, or Running Track, with Detailed Estimates, in the best possible form for placing before directors or purchasing committees



GIRLS' GYMNASIUM, MARSHALL HIGH SCHOOL, CHICAGO

HARDING SQUARE GYMNASIUM, SOUTH PARK COMMISSION, CHICAGO.

STANDARD ONE-TIER LOCKERS

The regular lockers used in connection with the Standard Box Lockers as Dressing Lockers.

A Box Locker Cabinet of the same size would have six times as many lockers.

STANDARD BOX LOCKERS

Have twelve times as many Lockers as the one-tier locker, or six times as many lockers as the two-tier locker it is used in connection with.

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NOTE.

The Building Sketches presented herewith are not architects' plans. They are intended to convey suggestions based on our many years of contact with the progress of Gymnasium Buildings.

RENSSELAER POLYTECHNIC INSTITUTE GYMNASIUM. TROY, N. Y.